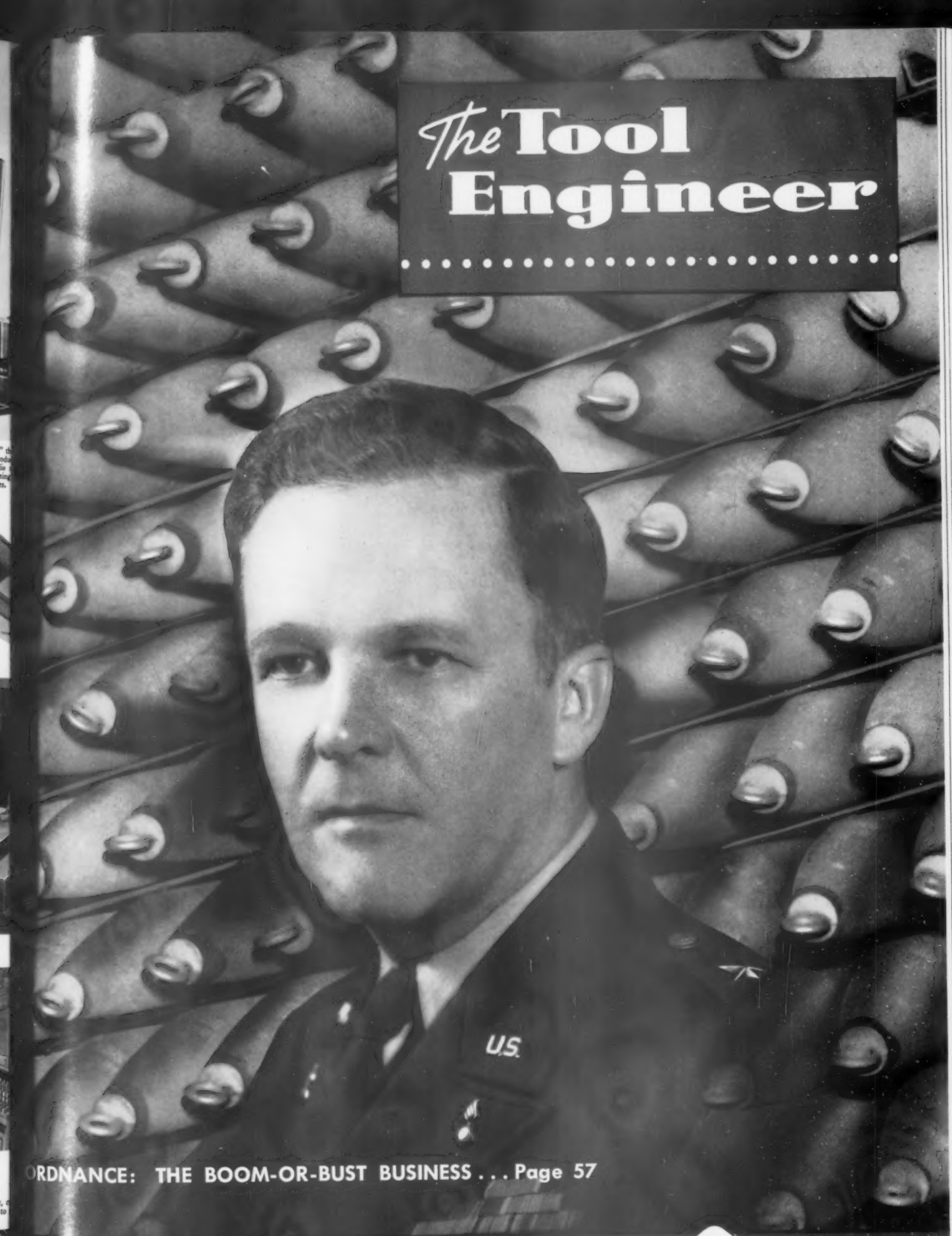
The Tool Engineer



ORDNANCE: THE BOOM-OR-BUST BUSINESS . . . Page 57

PUBLICATION OF THE AMERICAN SOCIETY OF TOOL ENGINEERS

DECEMBER, 1951
VOLUME XXVII, NO. 6

PLANNING
ENGINEERING
CONTROL
OF
TOOLING
EQUIPMENT
PRODUCTION

KELLERFLEX
FLEXIBLE SHAFT MACHINES
GIVE YOU BETTER FINISHING
with greater ease . . . at lower cost

THE VERSATILE *"Series M"* MACHINE

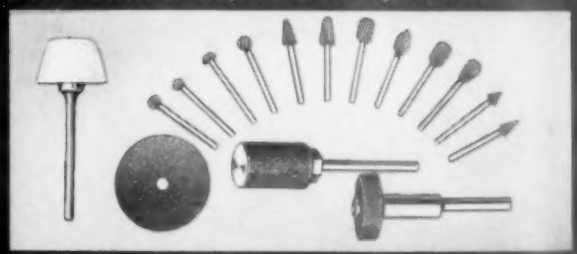
Use it anywhere in the shop . . . as a Floor Model, Bench Model or Suspension Model. Use it for power, for flexibility, for doing a better job faster, with less fatigue, at less cost.

16 constant shaft speeds — ranging from 1,000 to 6,000 or 2,000 to 12,000 rpm. Uses ¼, ⅓, ½ or ¾ hp motor.

A still wider range of speeds — ratio 1:3 — can be obtained by using Kellerflex High Speed Attachment.

THE SPEEDY JB-O MACHINE

Use P&W dental-type cables and handpieces for smaller work, and the standard JB-O cables and handpieces for the larger jobs. Either way, the JB-O features ample power and speeds from 800 to 9,000 rpm, or 2,500 to 10,500 rpm—without slow-downs or stops. Uses ⅛ hp motor.



Whatever the job—there's a P&W Tool to do it better. Recommended for the JB-O Machine is a full line of P&W Finishing Tools, including all shapes, sizes and kinds of HSS Burs, Carbide Burs, Grinding Wheels, Sanding Drums, Wire Brushes, Polishing Wheels.

Get full details on the "Series M" and the JB-O — and their accessories and attachments — from this single source of supply. Call any nearby P&W Branch Office at . . .

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VOLUME XXVII
NUMBER 6
DECEMBER, 1951

The Tool Engineer

Contents

THE TOOL ENGINEER is regularly indexed in The Industrial Arts Index.

AMERICAN SOCIETY OF TOOL ENGINEERS

THE TOOL ENGINEER is published monthly in the interest of the members of the American Society of Tool Engineers. Entered as second-class matter, November 4, 1947, at the post office at Milwaukee, Wisconsin, under the Act of March 3, 1879.
OFFICE OF PUBLICATION: 239 E. Chicago St., Milwaukee, Wis.
EXECUTIVE AND EDITORIAL OFFICES: 10700 Puritan Ave., Detroit 21, Michigan.

Thread Cost—2/10¢ Per Piece

LANDEX HEAD THREADS 300 PIECES PER HOUR AT LOW TOOL COST!!!

These operations illustrate a case history of the economy and efficiency of the LANDEX Head, designed for cutting precision threads at high production rates on automatic screw machines and other "live" spindle equipment.

In this instance, ½" American Standard Pipe Threads are being generated on sprinkler frames cast of red brass. The threads are cut into a relief 3/32" wide.

The wisdom of the tool engineer in selecting LANDEX Heads for performing these threading operations is borne out by information secured from the cost sheets. Production consistently averages 300 pieces per hour, floor-to-floor time, at a total threading cost of two-tenths of a cent per piece. Tool cost was held to a minimum with 5,000 pieces being threaded between chaser grinds.

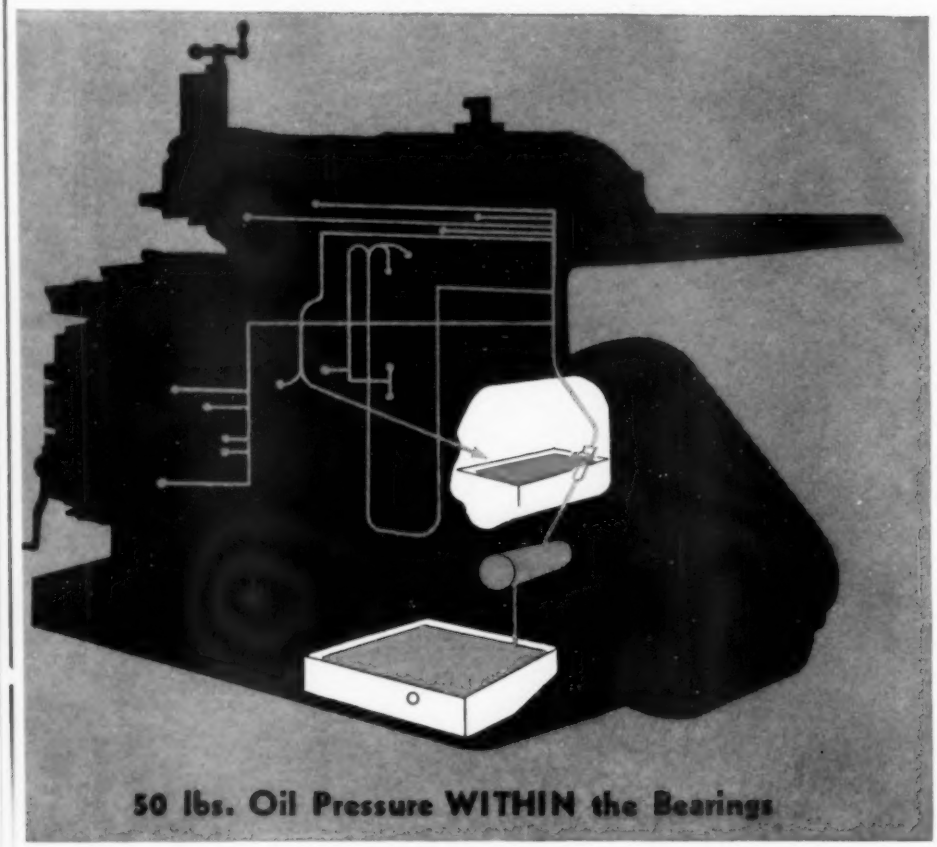
This is just one example of many successful applications of the LANDEX Head to jobs requiring high-speed thread production at an economical cost. For additional information, write for Bulletin F-90.

LANDIS *Machine* COMPANY · WAYNESBORO PENNSYLVANIA

—another Cincinnati Exclusive Feature!

50 lbs. Oil Pressure

maintained in running bearing surfaces



50 lbs. Oil Pressure WITHIN the Bearings

For the first time in the shaper field, bearings on a shaper operate under a positive 50 lbs. oil pressure within the bearings.

Even the most inaccessible bearings of the Cincinnati rocker arm and crank block assemblies operate under a positive pressure oil supply. For the first time, inefficient lubrication by dripping or spraying oil on these bearing surfaces is replaced by full pressure lubrication.

Wear and friction are reduced to a minimum giving Cincinnati Shapers extra years of maintained accuracy and maximum power at the cutting tool.

The system is fully automatic, saves the operator time and is insurance against oiling failures.

Write for Catalog N-5, fully describing these versatile, powerful and productive Cincinnati Shapers.

Other exclusive features . . .

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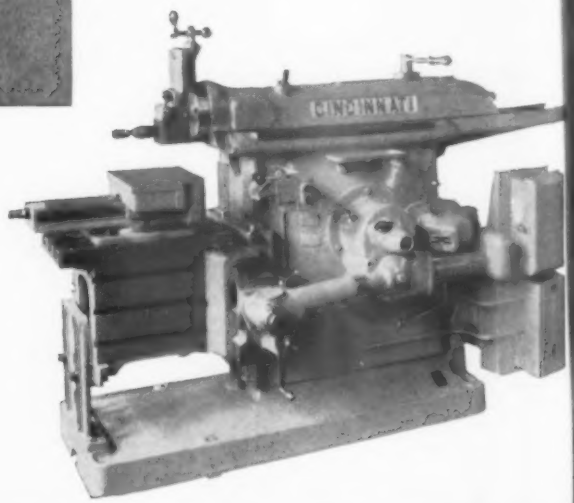
2. Cincinnati Multiple-Cam Feeds
3. Cincinnati Single Adjustment Tapered Gibs.
4. Cincinnati Extended Solid Ram Bearings
5. Cincinnati Dovetail Crank Block and One-piece Crank Gear.
6. Cincinnati Protected Table Support.



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BALANCED ACTION

MACHINE SCREW TAPS

SMOOTH, EFFICIENT TAPPING of small diameter holes is assured by Winter Machine Screw Taps. Like all Winter products these small but sturdy taps feature "Balanced Action." Accuracies of diameters, leads, thread forms, chamfers, flute spacings, and flute contours are held to extremely close limits. All Winter "Balanced Action" taps, including chip driver, hand, pipe, nut, tapper, and pulley taps, are stocked by distributors near you, and at factory branches in New York, Detroit, Chicago, and San Francisco. WINTER BROTHERS COMPANY, Division of the National Twist Drill and Tool Company, Rochester, Michigan, U.S.A.

WINTER

ALWAYS AT YOUR SERVICE

YOUR LOCAL DISTRIBUTOR carries a complete stock of WINTER Taps on his shelves—as close to your tapping problems as the telephone on your desk.

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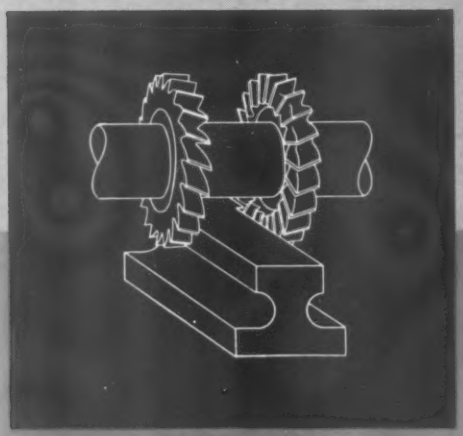
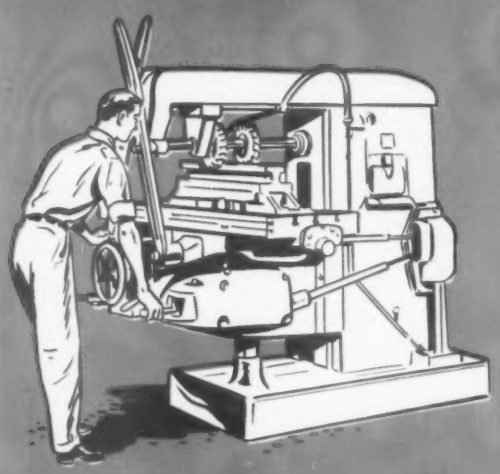
NATIONAL TWIST DRILL AND TOOL COMPANY, Rochester, Michigan, U.S.A.





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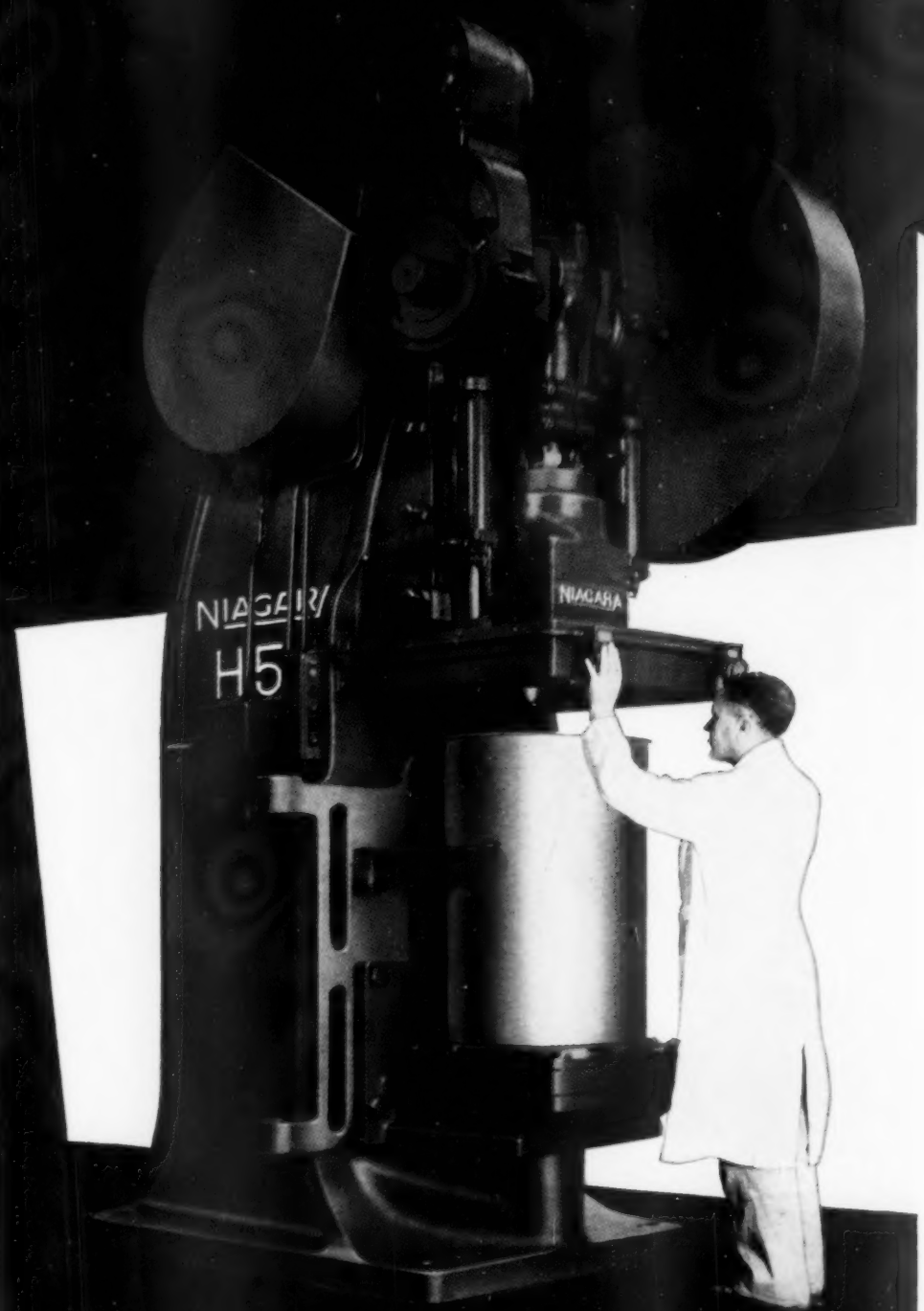
NIAGARA



Niagara H-5 Geared Horn Press with air sleeve clutch and air releasing brake. Arranged with special table and dies for curling and flanging the ends of a 55 gallon 18-gage steel drum body.

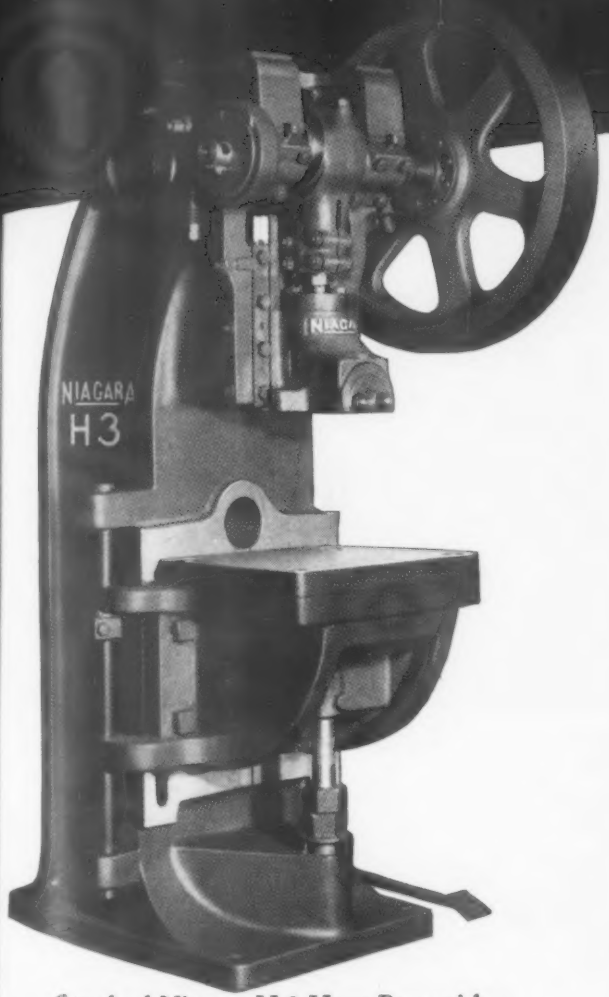
* In addition to ordinary blanking and forming work, these presses can be used for a variety of other operations requiring exceptional die height, such as curling, wiring and flanging container bodies. When fitted with a horn they can perform seaming, piercing, riveting and forming operations on the sides of formed shells.

Write **for specifications on sizes to fit your requirements.**

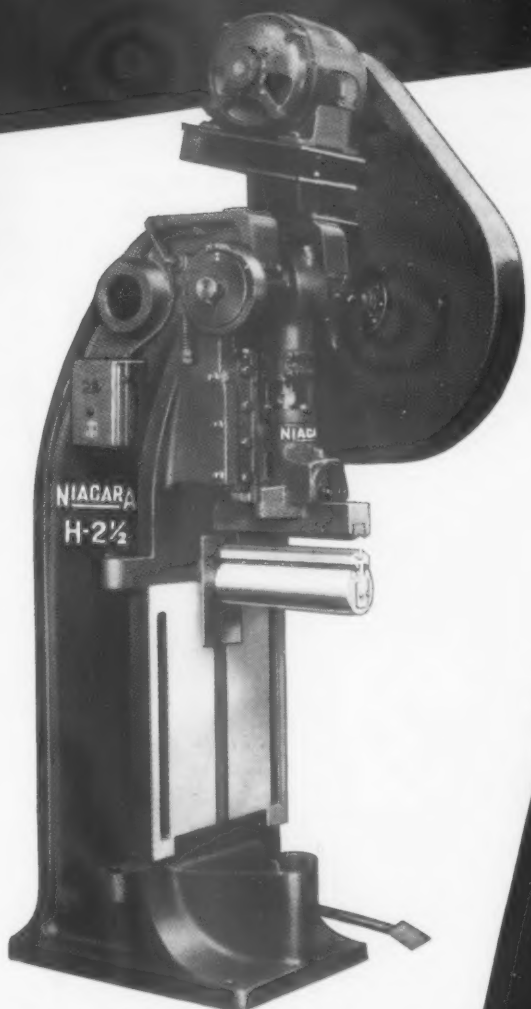
NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N.Y.

ADJUSTABLE BED HORN PRESSES

offer Versatility for Defense Production



Standard Niagara H-3 Horn Press with swinging, screw-adjustable table.



Niagara H-2½ Horn Press with duplex side seaming horn.

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here's where Heald's extra precision really PAYS OFF

—by putting extra precision into the parts that you produce

Of all the precision tests which a Heald machine must undergo, none is quite as important as the *last* one. For this test measures the precision, not only of the machine itself, but of the parts which it is to *produce*. Here your machine is put through its paces—producing *your* parts in exactly the same way it will be done on *your* production line. And the precision, accuracy and finish of these parts is the real measure of all the extra, painstaking care that went into every step of machine manufacture.

This is your positive proof of the extra precision and higher efficiency that you get from every Heald Bore-Matic, Internal Grinder or Surface Grinding Machine. Actual performance tells the story—a story that always means more and better production for YOU.

Inspector checks the prec... of water meter cones prod... on a Heald Bore-Matic. Extre... close tolerances must be m... every one of the 18 diffe... size parts produced on this ... chine, before it is approved ... shipment.

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Electricator Multi-Dimension Gage

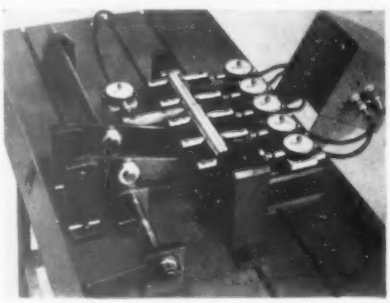
....ONE *QUICK* LOOK TELLS ALL!

Whether it's shells or shafts, fuses or jet engine blades—whether it's two, or twelve, or more dimensions you can tell at a single glance if all are within tolerance or not; for diameter or concentricity, and for length or any other dimension. You can also find out quickly *how much* any dimension is "off" so you can save and classify oversize pieces for reworking.

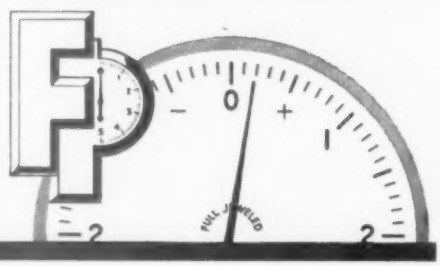
This is possible because the Federal-Electricator units which gage each dimension combine the advantage of the Dial Indicator graduations with electrical tolerance contacts. If any dimension is wrong its identity is immediately flashed on the light panel. The Dial Indicator graduations also make it easy to set the Gage to size limits. A pilot light tells you at all times that the Gage is in working condition.

Anything from small pieces to large can be gaged. Some Electricator Multi-Dimension Gages are made adjustable for various sizes (see photo below). Large pieces are lifted in or out by either hand or foot-operated lifting arms as shown in illustrations.

Tell us about your requirements, and let us figure out the Gage that will tell you what you want to know quickly and positively. FEDERAL PRODUCTS CORP., 1912 Eddy St., Providence 1, Rhode Island.



This Electricator Gage is adjustable for workpieces of various diameters and lengths. Notice a single monitor light signals when any dimension is "off".



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Largest manufacturer devoted exclusively to designing and manufacturing *all types* of DIMENSIONAL INDICATING GAGES

Boley No. 4 PRECISION LATHES

Three Types for Production or Tool Room

FOR SMALL RUNS

4E Lathe has headstock with hand wheel collet attachment, crank-type tailstock and cross slide.

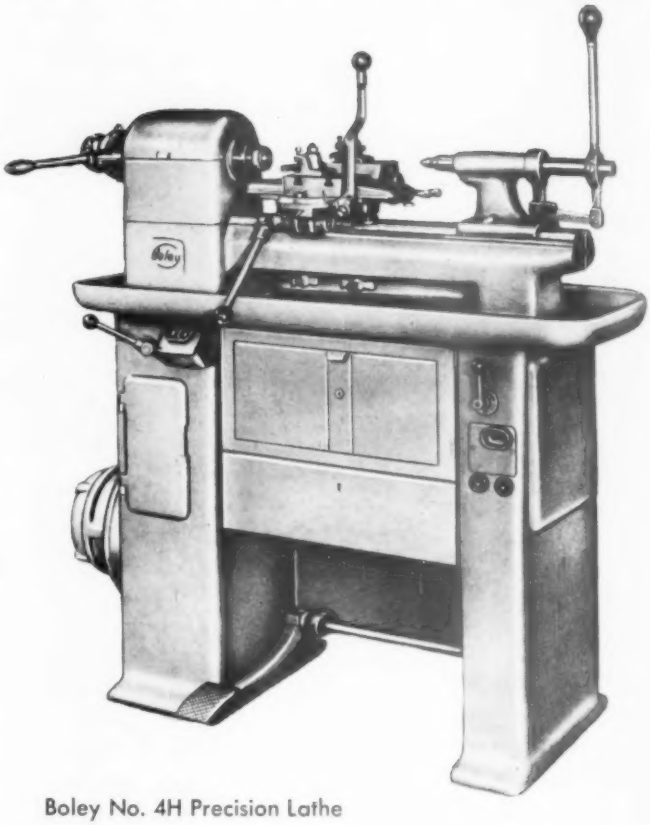
FOR PRODUCTION RUNS

4H Lathe has headstock with lever operated collet attachment, tailstock and cross slide.

4PS Short Bed Lathe has headstock with lever operated collet attachment and cross slide.

SPECIFICATIONS

Swing—10″, Distance between centers for 4E and 4H—18″, Collet capacity—¾″, Spindle speeds—6, 9, 12, 18 up to 3750 rpm. Powered by flange type motor with 2 or 3 speeds to three step pulley in headstock—Slides and tailstocks are interchangeable on all models.



Boley No. 4H Precision Lathe

Built to maintain toolroom accuracy on the production line, Boley No. 4 PRECISION LATHES have spindle speeds up to 3750 rpm. They are versatile, easy to operate, have multiple tool holders for cross slide and tailstock, adjustable stops to limit tool travel, lever for rapid chucking of workpiece while machine is running and rapid stopping of work spindle.

SEE THESE MACHINES IN OPERATION AT COSA'S NEW YORK SHOW ROOM OR SEND FOR DESCRIPTIVE LITERATURE.

OTHER BOLEY PRECISION MACHINE TOOLS

1, 2, 3 Precision Lathes—4″, 5″ or 7″ swing. Maximum spindle speeds from 3750 to 6,000 rpm.

4-L Lead Screw Lathe—for cutting 4 to 80 threads per inch and precision turning. 10″ swing. 12 or 18 spindle speeds up to 1900 rpm.

DW-4 Super Precision Lathe—for microfinish machining with diamond or carbide tools. 10″ swing. 3 spindle speeds up to 3000 rpm.

REV Turret Lathe—for intricate turning and thread cutting. 1″ or 1-5/8″ bar capacity. 6 to 8 turret tool holders. Spindle speeds from 300 to 2500 rpm.

Multiple Spindle Drilling and Tapping Machines—10 or 13 spindle speeds from 560 to 3000 rpm. Drilling capacity in steel up to 5/16″.

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1—SUPER FINISH REDUCES WEAR TO A MINIMUM

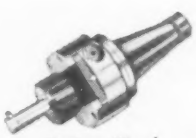
2—BLENDED RADIUS REDUCES TOOL HANG UP

3—100% CONCENTRICITY AND HARDNESS TESTS ASSURE ACCURACY

4—KNURLED HEAD PROVIDES QUICK SURE GRIP

5—COMPLETE VARIETY OF SIZES AND LENGTHS

Standard Drill Bushing



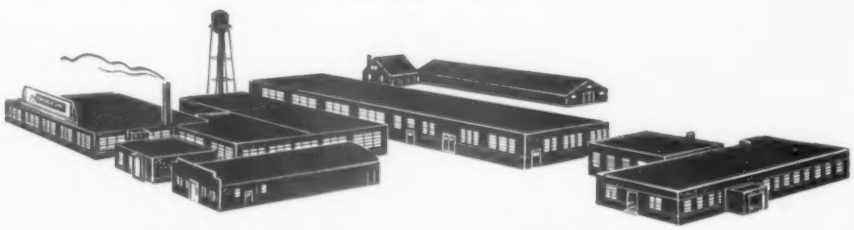
Boring Chuck

Mikro-Lok Boring Bar

"Kwik-Switch" Tool Holder

Floating Chuck

Standard Collet Chuck



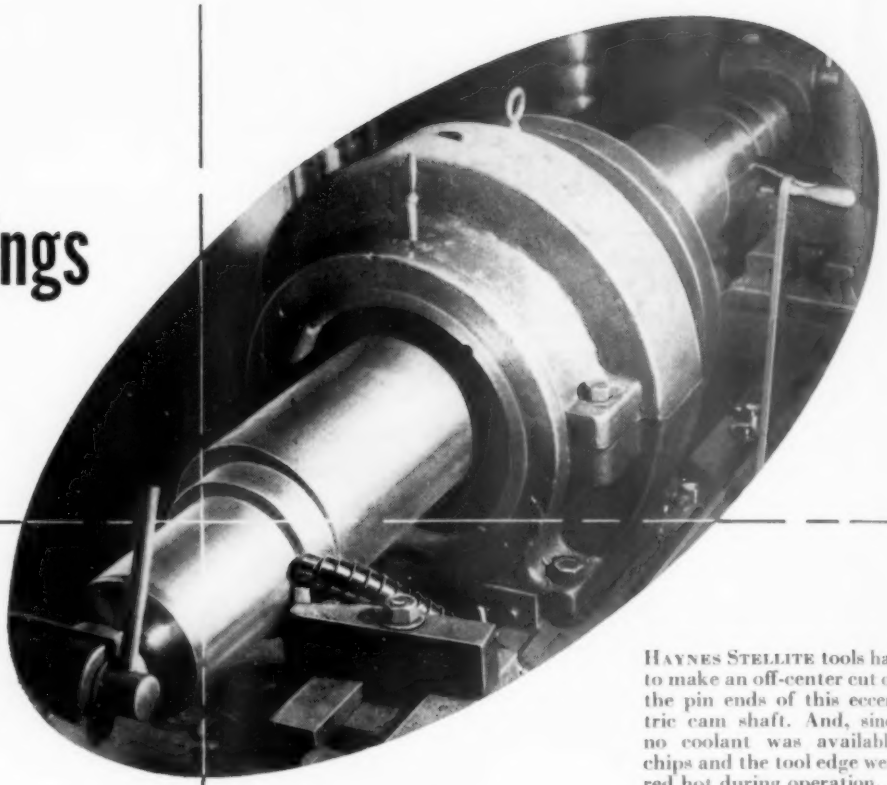
The modern home of finer production tools

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 3, MICHIGAN

154

Off-Center Forgings



HAYNES STELLITE tools had to make an off-center cut on the pin ends of this eccentric cam shaft. And, since no coolant was available, chips and the tool edge were red hot during operation.

MACHINED FAST...

WITH UNAVOIDABLE CHATTER and NO COOLANT

Even though the conditions on this job were unusual, the results give a good idea of the efficiency of HAYNES STELLITE tools. The workpiece was an eccentric gyrator shaft, forged from SAE 4340 steel, with a Brinell hardness of from 240 to 265. This 7-foot shaft vibrated during machining. And, since the shaft was driven at the eccentric cam section and the journal ends machined on offset centers, it was impossible to machine the journals without taking a severe intermittent cut. No coolant was available. Chips and the cutting edge of the tool were red hot.

HAYNES STELLITE tools did this job twice as fast as the material previously used. They had both the red hardness necessary to speed up the operation and the toughness to take the intermittent cut. With a feed of $\frac{5}{8}$ in. per min., and a depth of cut varying up to $\frac{11}{16}$ in., the tools removed nearly 13 cubic inches of metal per minute from the forgings.

This combination of excellent red hardness and good impact strength in cutting tools may be the answer to your own particular machining problem. For further information, get in touch with the nearest Haynes Stellite Company Office. Ask for a copy of the new manual-catalog, "HAYNES STELLITE Metal-Cutting Tools." It tells the whole story of HAYNES STELLITE cobalt-base tool alloys.

HAYNES TRADE-MARK *alloys*

Haynes Stellite Company
A Division of
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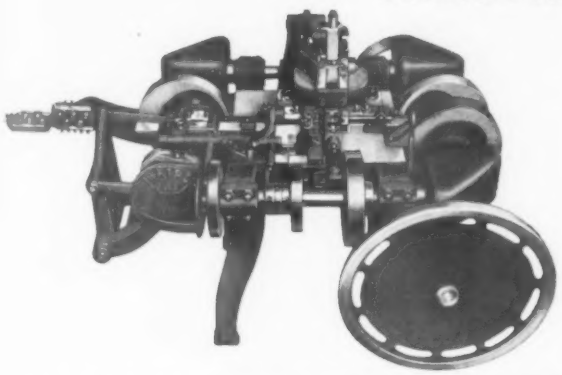
HIGH PRODUCTION TOOLING

FOUR BASIC HIGH PRODUCTION UNITS

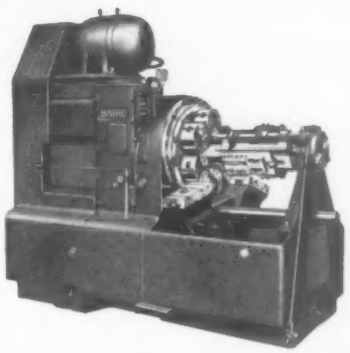
invaluable to Prime and Subcontractors



The four Baird machines shown on this page have been time-tested in many of the leading industrial plants of this and other countries. Their high speeds, multiple production features, and wide variety of tooling possibilities spell cost reductions thru high production and man-power savings. Automatic operation, wherever possible, has been designed into each unit as well as provisions to facilitate fast set-up. Check each machine . . . then . . . "ask Baird about it".

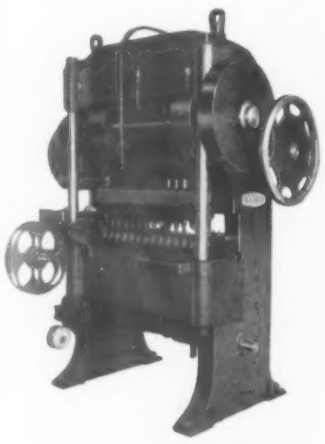
BAIRD 4 SLIDE MACHINE

The FOUR SLIDE (above) is a basic design machine . . . stocked and tooled to your specific requirements for repetitive production of wire forms and coiled stock work . . . almost unlimited in scope. Operation entirely automatic. Eight standard sizes cover wire diameters 1/32" to 1/2" and ribbon widths 3/16" to 1-3/8" . . . larger capacities on special order. You will find extra profits on your cost sheets with this machine in your plant.



BAIRD 76H CHUCKER

Completely automatic with 5 longitudinal and 5 cross slides, open construction for easy access to all tooling . . . fast set-up. Automatic operation of chucks does away with levers, valves, gages . . . leaves both hands free. Safety devices give full protection. There are many combinations of spindle speeds . . . all tool slides independently operated. Machine keeps young in performance, even when old in years.



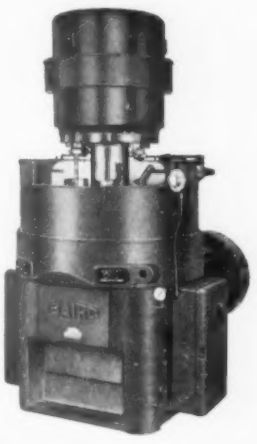
BAIRD MULTIPLE TRANSFER PRESS

Simply stated, this press combines, in one cycle, operations that might otherwise require several smaller machines with operator for each. It feeds coil stock for piercing, lettering, embossing . . . then cuts the blank, places it in transfer fingers, moves it to several tool stations, ejects it . . . all automatically. Ask us for Case Histories Bulletin.

BAIRD 5.4 VC LATHE

Continuously revolving turret eliminates non-productive indexing time in wet, dry cutting of light jobs, boring, facing, turning, etc. Tools feed both on "in" and "out" of cutting stroke. A most versatile tool for work within its range.

Bulletins on all above on request.



the BAIRD MACHINE COMPANY

STRATFORD • CONNECTICUT

AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

LAPOINTE

BROACHES

IN ALL SHAPES AND ALL SIZES

FOR SURFACE AND INTERNAL BROACHING

WE START WITH THE STEEL

. . . and we check its LAPOINTE-specified composition by disc inspection in our metallurgical laboratory. Assurance of *genuine quality control* is obtained in our heat treating department through the use of the Rayo-tube Temperature Control. For a double check, we treat pilot pieces of the same diameter as the tool, then we save a "coupon" of the tool itself!

AVOID DIVIDED RESPONSIBILITY! YOUR BROACHING MACHINES, TOOL

almost any production job will lend itself to BROACHING

. . . including cast iron, bronze, aluminum, stainless steel and most of the new alloys of titanium.

PRODUCTION SPEEDUP?

If you are interested in *stepping up your production capacity*, you probably realize that BROACHING is the *fastest possible method.*

REPETITIVE ACCURACY?

If you require many — or a few— parts *machined exactly alike* without costly methods involving rejects and re-working, remember that BROACHING gives you *repetitive accuracy to precision limits.*

LAPOINTE is the world's oldest and the world's largest manufacturer of broaching machines and broaches. Isn't it obvious that LAPOINTE has *more broaching experience* to offer, than any other manufacturer?

INQUIRIES WELCOMED on any problem involving broaching, or the possibility of broaching. Literature available by writing LAPOINTE, 5 Tower Street, Hudson, Mass.

THE *Lapointe* MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

Branch Factory: Watford, Herts., England

HUDSON LAPOINTE MASS.

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

AND FIXTURES CAN ALL BE ENGINEERED AND BUILT BY LAPOINTE

Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corp.

A-H5... air-hardening and easy to machine

Toolmakers rely on air-hardening tool steels to reduce the chances of cracking tools and dies during hardening. These steels are also preferred when only the minimum amount of distortion in heat-treatment can be tolerated. Air-hardening steels are deep-hardening, and have the high percentage of carbides that is so necessary for long wear.

From the toolmaker's standpoint, the principal objection to some air-hardening grades is their poorer machinability as compared with low-alloy tool steels. And that's why A-H5 is such a popular steel. It offers all the desirable properties of air-hardening steels, yet it can be annealed to 212 Brinell or less. It's a mighty easy steel to machine, especially when its all-around performance is considered.

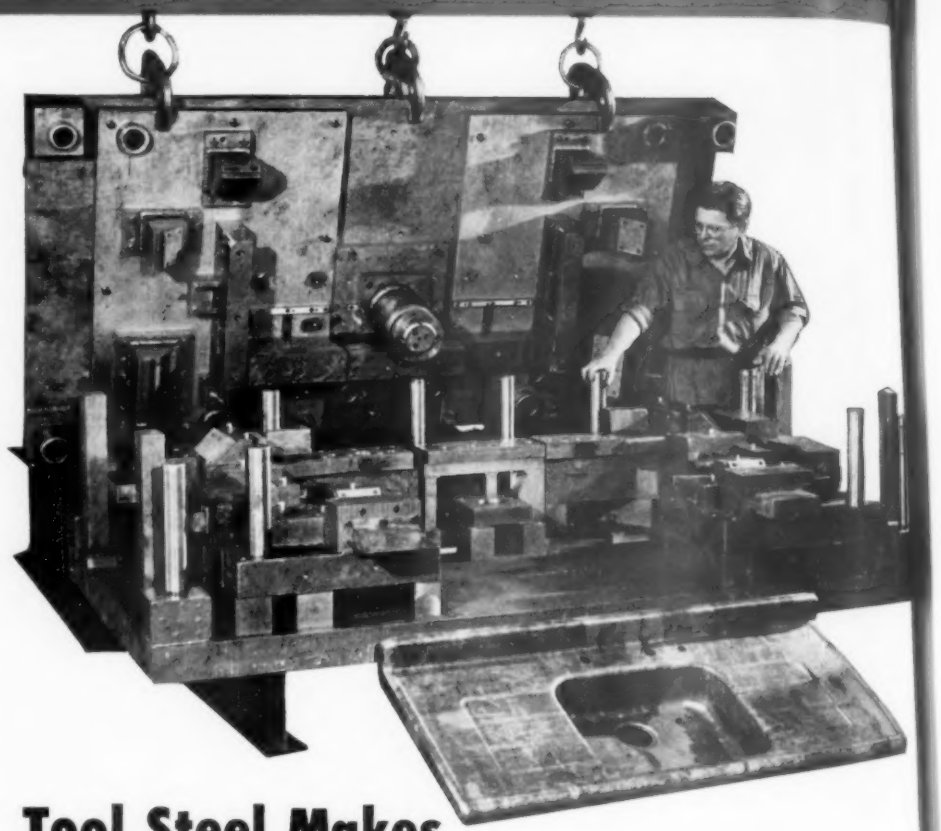
A-H5 is a general-purpose steel, suitable for nearly all tool and die jobs. Requiring a less drastic quench than standard oil-hardening grades, it also has greater wear-resistance, reduced distortion in heat-treatment, good shock properties. And its cost is on a par with the general-purpose, oil-hardening grades.

A-H5 is a steel worth looking into if you're looking for a safe, long-wearing tool-and-die grade that doesn't have to be pampered when it comes to machining and heat-treating.

Typical analysis:

C	Mn	Cr	Mo	V
1.00	0.60	5.25	1.00	0.25

Machining air-hardening tool steel causes no headaches in this shop because they're using A-H5. This user reports long wear and minimum distortion on a wide range of trimming and blanking dies.



Tool Steel Makes Kitchen Sinks, Too

Here's a man-sized die designed and built by A. F. & G. Tool & Die Co., Inc., Baltimore. Having wearing parts entirely of our BTR tool steel, this die is used to trim and pierce five different sizes of 14-gage steel kitchen sinks, one of which is shown in the foreground. Hardened to Rockwell C-56 to 58, this mammoth die will see service in a 250-ton press.

BTR, you know, is our general-purpose type of oil-hardening steel. It wears a long, long time and distorts very little in heat-treatment. Best of all, it's an economical steel that's easy to machine, easy to heat-treat.

Our Tool Steel Engineer Says:

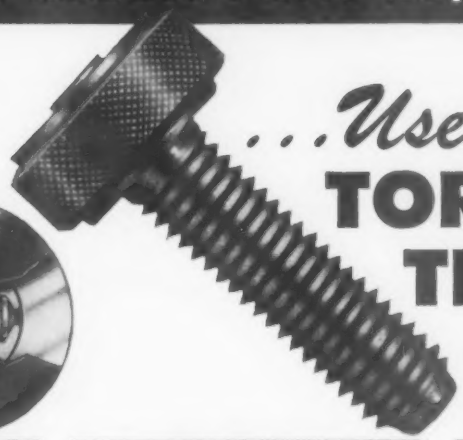
Remove the entire surface of tool steel bars

It's important to remove the outside surface of tool-steel bars, even though portions of this surface do not serve as a working surface of the tool or die. Higher hardening stresses are set up in heat-treating a tool that has any decarburized surface.

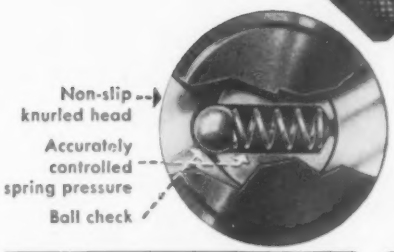
Equal amounts of stock should be removed from *all* sides of a bar. This avoids warpage of the tool during heat-treatment. Sometimes a toolmaker will merely "skin" one surface of a flat bar and then, in order to arrive at the required thickness, remove all the remaining steel from the other surface. This is bad practice, not only because it invites warpage, but also because it is an incomplete removal of decarburization from the skinned side.

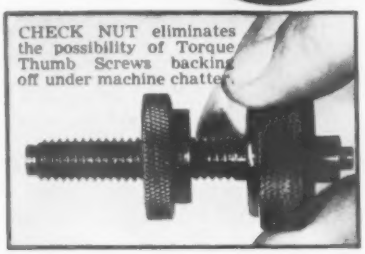
Bethlehem ULTRASONIC TESTED **Tool Steel**

How to Increase PRODUCTION
(And Reduce Parts Rejects)

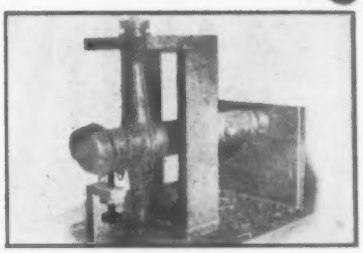


...Use VLIER TORQUE THUMB SCREWS

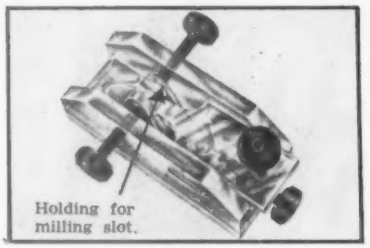




VLIER Torque Thumb Screws are holding tools that *automatically* prevent distortion of work pieces due to overtightening. *Check Nuts Furnished Free On Request.*



VLIER Torque Thumb Screws firmly support work pieces against drill or mill thrust as shown.



VLIER Torque Thumb Screws quickly provide accurate holding pressures—save time in changing work pieces.

As shown above, VLIER torque thumb screws are simplicity in themselves . . nothing to wear out or cause production stoppages. The spring-controlled ball check *automatically* prevents over-tightening without any attention on the part of the machine operator. *Absolute uniformity of product is guaranteed!* Choose the torque thumb screws you need from the many types available.

REGULAR, Type A — for general use

Item No.	Size	Overall Length	Head Dia. & Width	End pressure in lbs.
T-100	6 x 1¼	1 11/16"	⅞" dia. x 7/16"	10 to 12
T-101	8 x 1¼	1 11/16"	⅞" dia. x 7/16"	10 to 12
T-102	10 x 1¼	1 11/16"	⅞" dia. x 7/16"	10 to 12
T-103	¼ x 1¾	2 3/16"	⅞" dia. x 7/16"	12 to 14
T-104	⅜ x 1¾	2¼"	1⅛" dia. x ½	16 to 18
T-105	⅜ x 3	3½"	1⅛" dia. x ½	16 to 18
T-106	½ x 1¾	2¼"	1⅛" dia. x ½	18 to 20
T-107	½ x 3	3½"	1⅛" dia. x ½	18 to 20
T-108	⅝ x 1¾	2¼"	1⅛" dia. x ½	20 to 22
T-109	⅝ x 3	3½"	1⅛" dia. x ½	20 to 22

INVERTED, Type B — supports work on opposite end

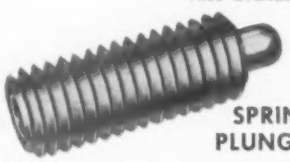
Item No. & Size		End Pressure (lbs.)
T-125	¼ x 1¾	12 to 14
T-126	⅜ x 1¾	16 to 18
T-127	½ x 1¾	18 to 20
T-128	⅝ x 1¾	20 to 22

TEEHEAD, Type C — for use with sliding V-blocks

Item No. & Size		End Pressure (lbs.)
T-150	¼ x 1¾	18 to 20
T-151	⅜ x 1¾	24 to 26
T-152	½ x 1¾	26 to 28

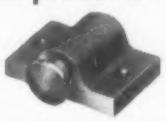
Also available in adjustable type where you set your own holding pressure.

Other VLIER products include:



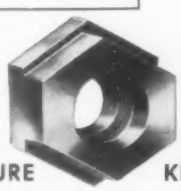
SPRING PLUNGERS

Available in 11 sizes Used for positioning, or wherever spring tension is desired.



SPRING STOPS

Designed for quickly positioning work pieces and providing 14 or 32 lbs. spring holding tension.



FIXTURE KEYS

Amazing timesavers. Allow work change-overs with practically no "down time."

MACHINE TOOL SPECIALTIES

Write for catalog or see your local VLIER Distributor for further information.

VLIER MANUFACTURING CO.
4552 Beverly Blvd., Los Angeles 4, Calif.

SQUEEZE PLAY

35 ton "Hy-Power" Riveter attaching brake backing plate assembly to rear axle housing with cold rivets.

. . . on assembly costs

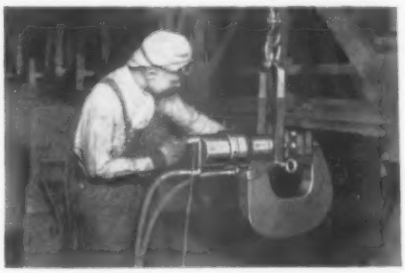
Yes, you can really put a "squeeze play" on assembly and production costs with a Hannifin silent-squeeze "Hy-Power" Riveter. It can take over your riveting operations—and many types of pressing, punching, forming and bending jobs—do them silently with push-button ease and efficiency that up production, reduce cost.

Heart of the "Hy-Power" hydraulic system is the unique "Hy-Power" Generator—a combination of motor, pump, oil reservoir, control valves and high pressure intensifier assembled as a compact, self-contained unit.

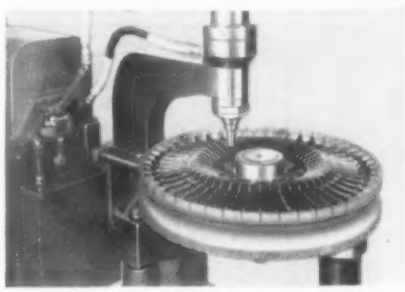
It powers the "Hy-Power" Riveter—the work tool that silently forms cold rivets at the touch of a button.

For a thorough discussion of how "Hy-Power" equipment can be utilized best in your plant, ask to have a Hannifin field engineer arrange an appointment with you.

Also, WRITE FOR YOUR COPY OF BULLETIN 150—*"Hy-Power" Hydraulics* Hannifin Corporation, 1119 S. Kilbourn Avenue, Chicago 24, Illinois.



One man handles this 50-ton "Hy-Power" Riveter with effortless ease in working on railroad car underframes.



A stationary "Hy-Power" Riveter joins hub and runner assembly of hydraulic couplings.

do ALL you CAN do . . . with

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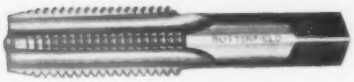
Air Cylinders • Hydraulic Cylinders • Hydraulic Power Units • Hydraulic Presses • Pneumatic Presses • "Hy-Power" Units • Air Control Valves

FOR BEST RESULTS
IN ANY TAPPING JOB
DEPEND ON BUTTERFIELD,
THE LINE THAT'S

100% INSPECTED...
100% COMPLETE!

FOR EXAMPLE...

Hand Taps



Standard. High speed or carbon steel.

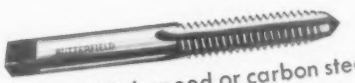
Three-Fluted. High speed or carbon steel.

Spiral Pointed. High speed or carbon steel. For tapping deep through holes or holes deep enough to allow bottom chip clearance.

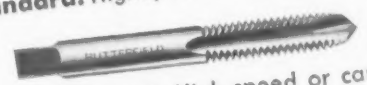
Spiral Fluted. High speed steel. Correct spiral for free cutting while ejecting chips from hole.

Stub Fluted. High speed steel. For threading holes in thin sections.

Machine Screw Taps



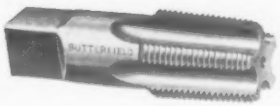
Standard. High speed or carbon steel.



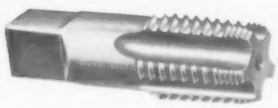
Spiral Pointed. High speed or carbon steel. For tapping deep through holes or holes deep enough to allow bottom chip clearance.

Stub Fluted. High speed steel. For threading holes in thin sections.

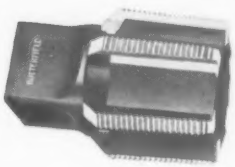
Pipe Taps



Taper or Straight. High speed or carbon steel.



Interrupted Thread. High speed steel.



Inserted Chaser. High speed steel.

Bar stock being tested for microstructure . . . one step in Butterfield's 100% inspection.

And MANY OTHERS, INCLUDING . . .

STOVE BOLT TAPS • PULLEY TAPS • STAYBOLT TAPS
BOILER TAPS • NUT TAPS • SERIAL TAPS
TAPPER TAPS • MUD OR WASHOUT TAPS

Remember: There's a Butterfield Tap for top performance in every material.

SEE YOUR NEARBY BUTTERFIELD DISTRIBUTOR FOR PROMPT DELIVERIES AND SERVICE

Union Twist Drill Company

BUTTERFIELD DIVISION

Derby Line, Vermont • *In Canada:* Rock Island, Quebec

BUTTERFIELD

THE 100% INSPECTED TOOLS

Every Tool Individually Inspected

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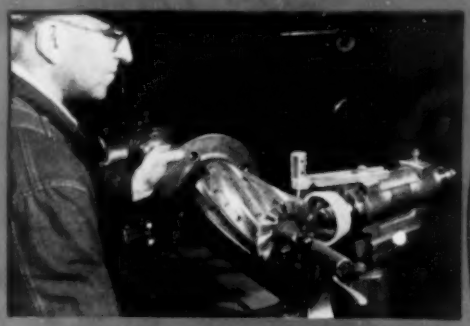
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-12-21

Cutting Tool Room Costs

V10 BOND WHEELS. With these wheels, you are assured of accurate low-cost grinding of tool steels—even Hi-Vanadium. White in color, they have unusual form and size holding qualities. And so versatile, wheel inventory is greatly simplified.



V20 BOND WHEELS. Need fast and accurate repetitive grinds? Here's the RIGHT wheel. Blue-gray in color, they're noted for a high rate of stock removal at reduced wheel pressures, minimum heat generation. Producing higher finishes, they extend tool life between grinds, thereby extending over-all tool life.

Only **CARBO**

TRADE

"Carborundum", "Aloxite" and "Green-Grit" are trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, New York

easy with RIGHT Abrasive

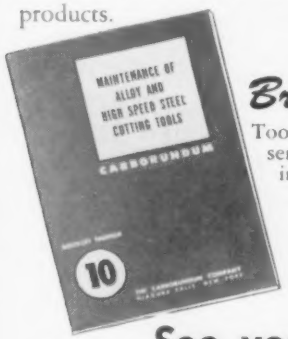
"GREEN-GRIT" WHEELS

Carbide grinding calls for a cool-cutting wheel. CARBORUNDUM suggests the "Green-Grit" wheel, with superior form-holding qualities for lowest cost, accuracy and finish. Try it for the best carbide grinding results. Available in a complete range of grades.

No matter what your abrasive job in the tool room, there's a product by CARBORUNDUM to do it best. You select the *right* product for every job in the tool room from CARBORUNDUM's *complete line* of abrasives.

Your CARBORUNDUM representative or distributor is equipped to recommend not just a product, but a method. From his knowledge of *all* abrasives, he can help you select the very best abrasive method, and *then* recommend the abrasive product to be used. In this way, you *know* you're getting the best results at lowest cost.

Don't forget the rest of the complete CARBORUNDUM line—Diamond Wheels, for instance, or tool room sticks, and complete selection of all coated abrasive products.



Brand New
Tool grinding booklet sent FREE. Detailed information, charts, illustrations.

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makes ALL Abrasive Products...to give you the proper ONE

Atlas CLAUSING
12″ LATHE 6300 SERIES

Atlas CLAUSING
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CLAUSING—a name highly respected for years in thousands of plants—is now a division of Atlas. Atlas-Clausing will continue with the advanced features that are responsible for the Clausing lathe's excellent reputation. And the combined efforts and experience of Atlas and Clausing engineers promise even greater advancements in modern precision lathes.

6300 SERIES

★ 1″ COLLET CAP., 1⅜″ BORE. ★ 12¾″ SWING OVER BED, 7½″ OVER SADDLE. ★ 24″-36″-48″ BETWEEN CENTERS. ★ A.S.A. —L-00 TAPERED KEY DRIVE SPINDLE.

Outstanding construction and performance features include: Bed—heavy, thick-walled with 2 Vee-ways and 2 flat ways precision ground.

Headstock—spindle is forged steel, mounted on selected Timken tapered roller bearings, with ground, hardened nose. Gears are steel, run in bath of oil. Outboard, underneath drive, with dual V-belts. 8 speeds—50 to 1300 RPM. Variable drive (optional) provides infinite variety of speeds between 30 and 1400 RPM. Enclosed quick change gear box, with steel gears and splash lubrication, provides instant selection of 48 threads or feeds, thread range 4 to 224. Acme thread lead screw—supported in gear box by Timken tapered roller bearings.

Apron—heavy, double-walled, automatic, with splash lubrication, positive clutch, steel and cast iron gears.

4800 SERIES

★ ½″ COLLET CAPACITY, 25 32″ BORE. ★ 12¾″ SWING OVER BED, 7½″ OVER SADDLE. ★ 24″-36″-48″ BETWEEN CENTERS. ★ 1½″-8 THREADED SPINDLE.

Outstanding construction and performance features include: Bed—heavy, thick-walled with 2 Vee-ways and 2 flat ways precision ground.

Headstock—spindle is ground alloy steel, mounted on selected Timken tapered roller bearings. Countershaft has friction clutch and brake for stopping spindle without stopping motor. Countershaft spindle turns on ball bearings. V-belt drive. 12 speeds—43 to 2270 RPM. Quick-change gears, 48 thread selections, 4 to 224. Gear box shafts are ground steel, turn on ball bearings. Gears are ½″ wide steel. ⅜″ lead screw with Acme thread.

Apron—heavy, double-walled, automatic with splash lubrication, positive clutch, steel and cast iron gears.

Catalogs sent on request.

Atlas CLAUSING PRECISION MACHINE TOOLS

ATLAS PRESS COMPANY
1295 NO. PITCHER STREET
KALAMAZOO, MICHIGAN

Production News

ABOUT *Lusol*.. —THE ALL-CHEMICAL METAL-WORKING SOLUTION

FROM F. E. ANDERSON OIL COMPANY · PORTLAND, CONNECTICUT

LUSOL—THE HOTTEST THING ON THE COOLANT MARKET

Today, right now, you can take the first step toward startling production gains in your own shop. The free book, offered below, gives you the facts about Lusol, the metal-working solution which is revolutionizing coolant practices and machining procedures. You'll learn how plant after plant, all over the country, has stepped up output from nearly every machine in its shop. Actual case histories of 50%, 200% and even 500% increases in machine speeds and production rates!

Lusol replaces soluble oils and emulsions, as well as regular cutting oils on many operations.

NEW TYPE COOLANT—The simple, factual evidence in this book shows *why* Lusol cools faster, increases tool life, reduces the number of grinding wheel dressings. You'll see how Lusol, an oil-free concentrate added to water, makes the best coolant you ever used. How it makes water wetter, so it removes heat faster. How it decreases the surface tension of water, so it penetrates to the very cutting edges of your tools and keeps grinding wheels from loading up.

You'll learn the extra advantages possible with oilless Lusol. Advantages like elimination of degreasing before painting or assembly. How floors and workers' clothes stay cleaner. No oil-soaked shoes. How Lusol licks machine odors and dermatitis. And how it protects machines and products from rust.

SAVINGS IMPRESSIVE—Truly, these are savings so important and far-reaching that no one who owns or operates a machine tool can afford to pass them up. So today take time to ask for your copy of the 20-page book, "Lusol, the all-chemical metal-working solution."

Over 40,000,000 Gallons of LUSOL SOLUTION USED TO DATE

In plants all over the nation, in almost every type of metal-working operation, over 40,000,000 gallons of Lusol solution have been used, boosting production rates, saving tools and lengthening grinding wheel life.

In each of these applications Lusol has replaced another coolant, showing substantial savings. Obviously, an enormous amount of technical know-how has been accumulated during these conversion periods. This data is constantly sent to Lusol sales engineers in the field. Your local Lusol sales engineer, listed in the classified phone book under "cutting oils," is well equipped to answer your questions.

users say*

case histories of Lusol at work

A BEARING MAKER—"Look at that fine finish! No smoke around the machine, and the bearing-half comes off the broach so cool it can be gauged for accuracy immediately."

•

A JOB SHOP—"41 drills and 25 taps were required for producing 1,984 pieces in 50 hours. Changed to Lusol and produced more pieces in same period with 12 drills and 8 taps."

•

A MOLDING MANUFACTURER—"Lusol keeps the machines clean; a distinct advantage over the lubricant we formerly used. The men like Lusol because they can see the work clearly, right up to the time the metal enters the rolls."

•

A MACHINE TOOL BUILDER—"We remove 245 cubic inches of cast iron per hour in that surface grinder. Instead of 17 wheel dressings per chuck load formerly required, only 7 are needed now with Lusol. We're going 100% to Lusol."

*User names furnished on request.

LUSOL proves mild and non-irritating to workers' hands

The cleansing action of Lusol, together with its super-wetting properties, sometimes prompts questions about dermatitis. "How does such an efficient metal-working solution affect workers' hands?" It doesn't!

The case of the man shown above is typical of Lusol's performance in actual shop conditions. Sulfurized cutting oil, formerly employed, so irritated this man's forearms that he had to wear the plastic sleeves you see in the photograph. With Lusol in his machine, he has discarded the sleeves; has no skin trouble at all.

FREE BOOK

Get complete facts about Lusol by writing for this 20-page booklet. It contains information on machine cleaning, maintenance of Lusol solutions, elimination of dermatitis and odor in machines, plus many case histories of Lusol at work. Write F. E. Anderson Oil Company, 213G, Portland, Conn.

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THE TOOL ENGINEER

Publication of The American Society of Tool Engineers

The **Tool Engineer**

a Letter from the Editor...

During the past month the writer was privileged to attend a tool engineering conference at Urbana, Illinois, held under the sponsorship of the University of Illinois with the cooperation of the Illinois chapters of ASTE.

The meeting appeared to be a superficial success, but I believe that its success—and its advantages to ASTE—was fundamental. Let's briefly look over some of the accomplishments.

A regional meeting of ASTE chapters offers many advantages—our Board of Directors recognized this when they voted to establish the Evansville, Ind., meeting as the first of several to be spotted at key industrial centers. Urbana introduced a new setting—a university campus—which provided a firm foundation for a conference on a high technical level.

Understanding and a sort of cooperative recognition between the profession of tool engineering and the nation's technical institutions are not only needed, but are important in the advancement of both parties. I can find no better way of achieving this understanding than by the form of intimate association between tool engineers and the university which Urbana provided.

The possibilities are still unexplored. Perhaps a conference of this type, sponsored parallel with our regional meetings as currently envisioned, could provide a new type of forum devoted to the important theoretical aspects and research developments in the field of tool engineering. At any rate, *The Tool Engineer* will, as in the case of the Urbana meeting, arrange to publish the most important of the papers for the benefit of *Tool Engineer* readers.

Gilbert P. Muir

CYLINDER POWER increases production

UP TO 100%...

Use It 1001 Ways For Pushing, Pulling, Lifting, Pressing, Clamping, Controlling

INVESTIGATE Hanna Cylinder Power to speed production and lower costs. Hanna Air and Hydraulic Cylinders are used in hundreds of applications throughout industry—in all types of machines and equipment—to get things done faster, relieve tiresome manual operation, simplify actuation and control. Cylinder Power is easily adaptable, safe and inexpensive!

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AIR and HYDRAULIC CYLINDERS

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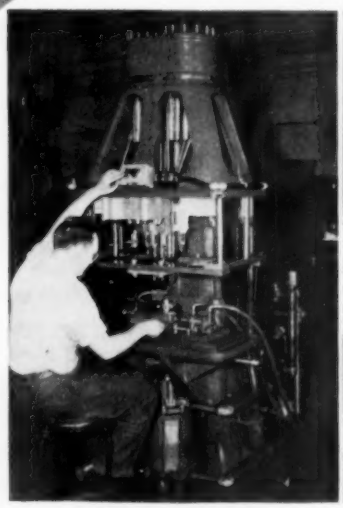
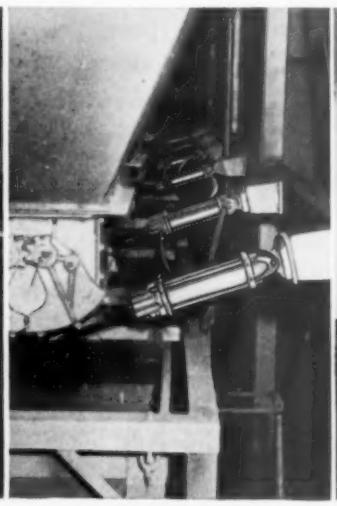
Ask for Catalog No. 236 for Hanna Low Pressure Cylinders — Catalog 233A for Hanna Hydraulic Cylinders and Catalog 254 for Hanna Valves.



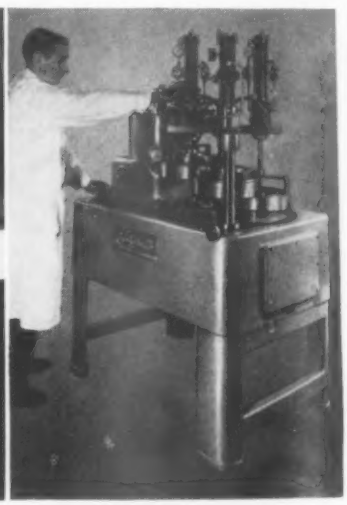
REDUCES FATIGUE

One pushbutton starts the Natco cycle for continuous, automatic operation of this drilling machine. Hanna Hydraulic Cylinders feed the table and Hanna Pneumatic Cylinders engage drillpress clutch and workpiece clamp.



REMOTE CONTROL

What could be more simple and dependable for opening and closing these hopper gates than Hanna Cylinders? They are operated from remote station with Solenoid Valves and Pushbutton Panel.



DOUBLES PRODUCTION

Hanna Air Cylinders raise and lower the entire conditioning ring-pressure plate units to permit fast, efficient loading and unloading of parts on this Lapmaster. In many cases, production has been doubled over manual operation.

Hanna Engineering Works

HYDRAULIC AND PNEUMATIC EQUIPMENT . . . CYLINDERS . . . VALVES . . . RIVETERS

1768 Elston Avenue, Chicago 22, Illinois

The Tool Engineer

Editorial

The Young Tool Engineer

There is one phase of our responsibility as tool engineers that is frequently overlooked—and is increasingly important now. I refer to the responsibility of the profession generally—and of the individual tool engineer particularly—in the education and professional development of the young tool engineer.

In education we as a body—ASTE—can assist him. But professional development is so much an individual campaign, an individual growth, that it is primarily a personal concern for each of us.

Professional development is not merely a matter of teaching a young tool engineer a job, at the plant, and over an eight hour period. It is a matter of his getting proper background, proper associations and new ideas.

Thus while an ASTE chapter meeting can, as a joint effort, contribute to the development of younger tool engineers, its success in doing so rests largely on the individual backing and contributions of older, successful members. The younger tool engineer needs this contribution in two ways: he needs the practical, experienced floor discussion which only the more experienced member can provide, and which forms a substantial part of any successful technical meeting. Second is the psychological support lent by the presence of our older—and too often less active—members. If you will look back to your earlier years, this point is obvious.

Professional associations and new ideas are necessary. We can make our contribution here by actively encouraging participation and attendance by young tool engineers under our direction at the chapter, regional and national ASTE meetings which will provide him with both of these requirements for professional development.

With the tool engineering demands ahead, and our inadequate supply of trained tool engineers, this is a responsibility of the utmost importance. Let us individually do something about it.

J. P. Demuth

PRESIDENT
1951-1952

Butt Brazing Carbide Tools Without Tip Pockets

By David Kauffman
TOOL ANALYST

BRAZING CARBIDE TIPS to tools without the use of conventional tip pockets is known as butt brazing. The practice of protecting the carbide tip with a pocket probably stems from the Twenties when carbide was more valuable than gold. The advantage of a positive location with a tip pocket and the support it gives, however, does not compensate for the disadvantage of incorporating brazing strains into the tools. Cracked carbide is the largest mortality factor in the life of a tool. Brazed on three sides to a material having a totally different coefficient of expansion, the carbide is distorted and exceeds its elastic limit.

Exceeding the elastic limit is another way of saying the carbide is cracked. Often this limit is not quite reached, but distortion and strain are in the tool. Slight grinding pressures or the shocks encountered in machining will crack the tool very easily at a later date. It is then that the argument of bad grinding practice is used to blame the crack on servicing. Eliminating brazing strains will not solve all tool problems, but since it is the largest factor contributing to cracking, its elimination will lower tool costs considerably.

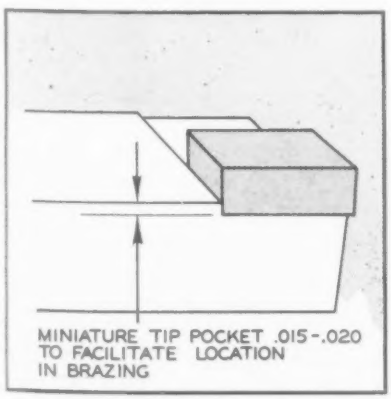
Mr. Kauffman is a tool analyst with the Ford Motor Company.

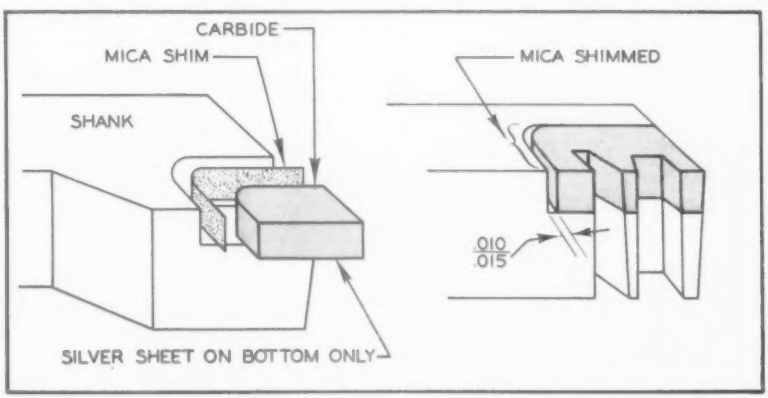
There is a variety of methods which may be used to eliminate the strains caused by butt brazing. Some described here are obvious and common while others are experimental and their merit will have to be proven by the user. Most of them have been tried and used with varying success. Tool engineers charged with carbide tool development will find that some of these techniques result in improved tool design.

Miniature Tip Pocket

Almost any kind of tool can be made to perform satisfactorily with only one or two surfaces brazed instead of three. For test purposes, carbides brazed on only one surface have been hammered off. The carbide smashed out while the brazed portion held. The lack of a location shoulder during brazing makes it awkward to properly place the carbide. This can be overcome by using a miniature tip pocket or shoulder as shown in Fig. 1. This idea can be applied to any type of tool, and while it locates

Fig. 1 (left). Miniature tip pocket to facilitate locating for butt brazing. Fig. 2 (right). Brazing with a mica shim to relieve strains.





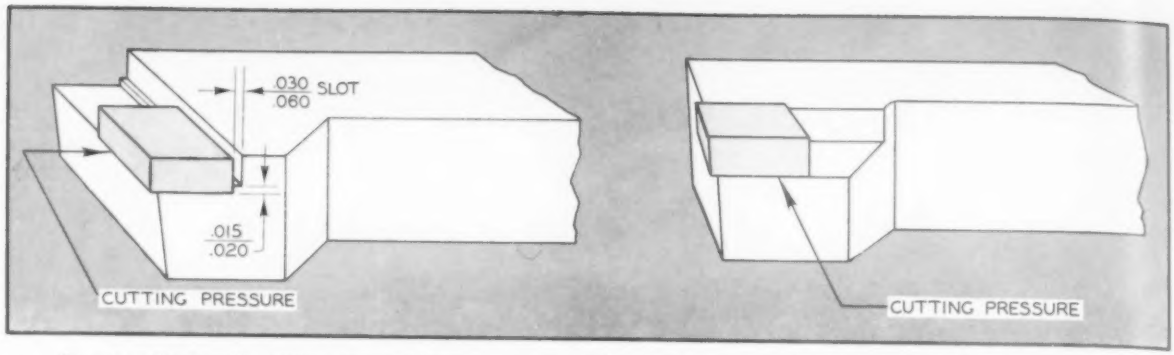


Fig. 3. Slash-mill design for facing-type tools (left) and for turning tools (right). The figure at the left illustrates a means of relieving strain from the back of the carbide.

the tip, it is so small it cannot cause any damaging strains.

A number of tool fabricators are in effect eliminating the tip pocket, yet keeping its appearance by shimming the carbide away from the sides with mica. See Fig. 2. In effect, this is a butt-brazed tool which should have a longer life at no increase in cost. Sometimes the mica is placed around only one side of the carbide, usually at the shortest side, to partially relieve strains. See Fig. 2B. Where tools are large and have forms in them, this should prove beneficial. There are also some ceramic paints available for the same purpose. Painting an adjacent surface of a toolbit to be brazed will prevent welding at that point.

The tool described above is made by placing the carbide in the tip pocket with a silver sheet (and flux) beneath it, and having a mica shim about 0.005 to 0.010 in. thick curled around the carbide as illustrated. The tool is then brazed in a normal fashion. The mica prevents the carbide from being brazed to the sides of the tip pocket.

Slash Milling

Another method of relieving strains is known as slash milling and is illustrated in Fig. 3. Obtaining maximum strength in the shank and having the shoulder of the pocket at right angles to the direction of the cut are two factors which determine the direction of the milling cut in a slash-milled tool. Tool costs should be considered when comparing the slash-milled tool to one with a conventional tip pocket. When servicing the tool, there is less steel to be ground, less grinding heat and less diamond wheel wear. High temperatures caused by machining can be more easily dissipated and the tip permitted to expand without the restraint present with a conventional tip pocket.

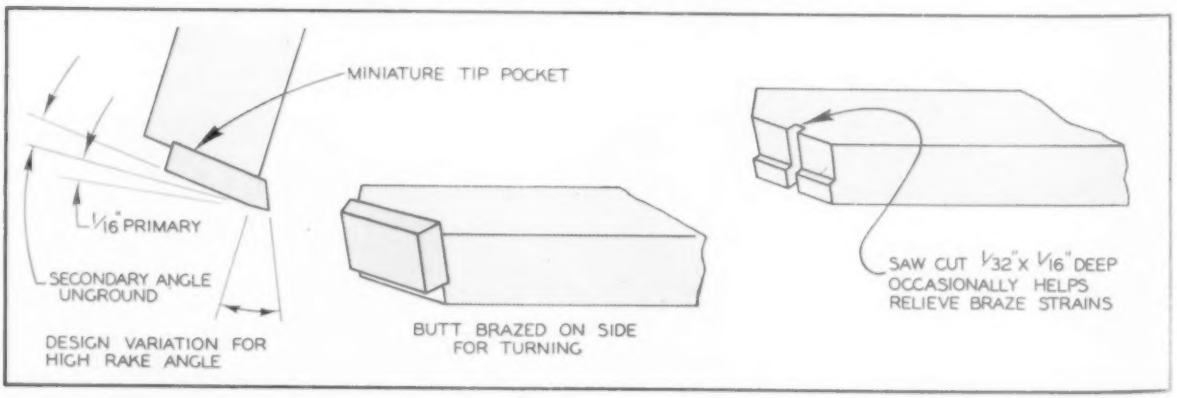
Having the carbide tip protrude above the steel surrounding it by one-half to two-thirds of its thickness will also help to prevent brazing cracks. Tools ground from the top are especially suited for this design, since it eliminates grinding steel with a diamond wheel.

Much of the credit for the high planing speeds achieved to date can be given to the carbide tool which is butt-brazed with a nickel shim. A majority of the planing tools made today are of this construction.

Side Brazing

The next variation to be considered is the tool with the carbide brazed onto the side of the tool. In emergencies, a right-hand tool has many times been used as a left-hand tool by turning it over on the side with satisfactory results. Fig. 4 shows a single-point tool designed in this manner. The shank is prepared as if a tip-pocket tool were being made, but the carbide is placed in the position

Fig. 4. Butt brazing the carbide on one side of the tool.



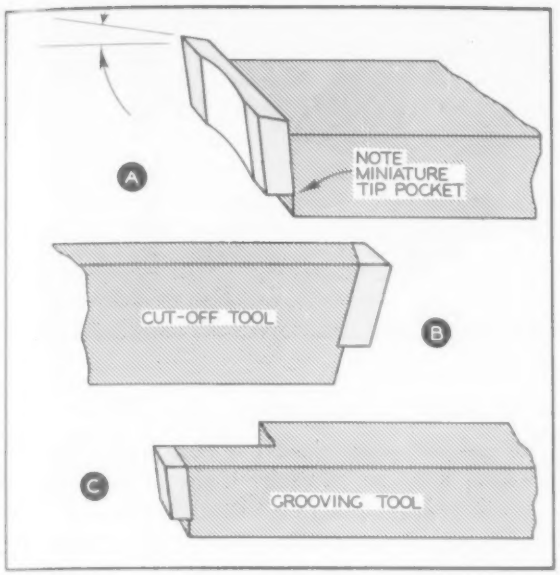


Fig. 5. Butt brazing the carbide on the front of the tool shank.

shown. Induction brazing is preferred for this type of tool. The primary cutting edge only is ground, and since the rake has only a small area, it can easily be ground for the particular job.

Tool Failure Prevented

Tests on heavy duty work have proved that when properly brazed, tools of this design will not fail. The extreme thickness of the carbide supports the cutting edge without any tendency to sink into the softer shank. And with the carbide almost entirely in the clear, it can easily dissipate the heat from heavy cutting. There is also less carbide to grind when the tool is fabricated or serviced. Since it is brazed at the secondary clearance angle, a primary clearance angle only is ground for a distance of 1/16 in. A miniature tip pocket can be employed to facilitate location in brazing.

Fig. 5 shows a tool with the carbide brazed in front of the shank, which opens a new field of thinking in designing tools. This design is especially adaptable for cut-off and grooving tools, as well as certain form tools. Resharpening is done from the top. On the narrower tools the steel shank absorbs the weaving which takes place, for example, in cutting-off and grooving, and keeps the carbide from cracking or shearing off the tip pocket. Since the point is almost entirely carbide, it can resist the deflection of cutting forces which might crack a thin piece of carbide. It is suggested that hardened steel, e.g. air-hard, tool steel, etc., be used for the shanks of these tools.

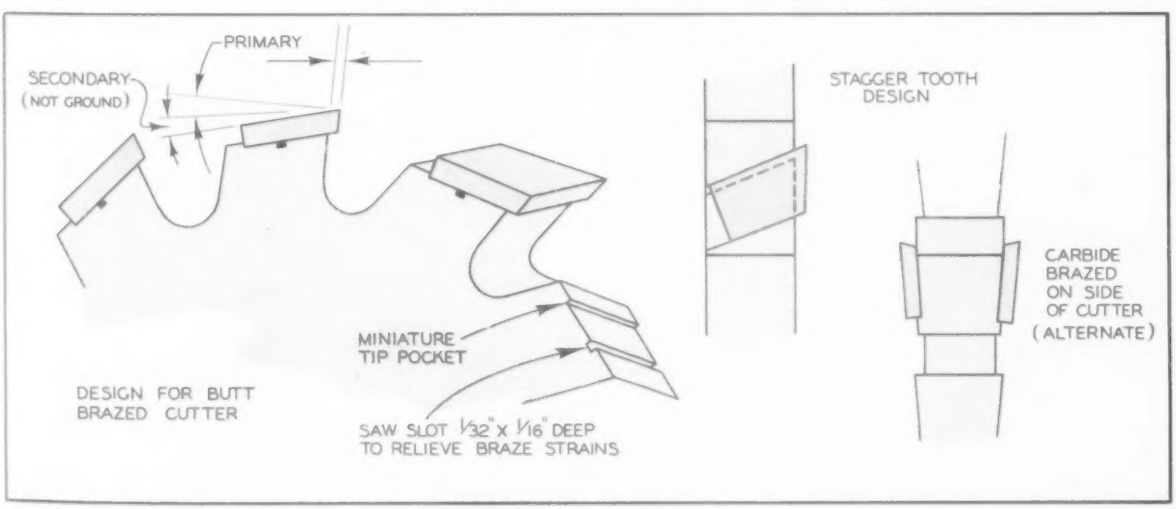
Regrinds Increased

Most milling cutters, such as side mills, stagger-tooth mills and slotting mills, can be adapted to this method of butt brazing. There has been a surprising record of performance obtained by a number of manufacturers using the design described here. The immediate and apparent objection to what appears to be a radical departure in design is that the carbide seems to be placed incorrectly with nothing to back it up. But once the conception is accepted that the carbide will not come off during use, the idea becomes obvious. The illustrations in Fig. 6 show how and where these carbide tips are placed. Notice that most of the length of the carbide can be utilized for regrinding, which should result in an additional five or ten regrinds.

The grinding of this cutter is confined on the OD to a small primary land. The rake and side clearance angles are ground as usual. When the carbide tips are placed on the side of the cutter body, the length of tool life and adaptability to certain production requirements are increased over conventional cutters.

Carbide tips for stagger-tooth cutters should be preformed or ground approximately to shape before

Fig. 6. Design for a butt brazed cutter



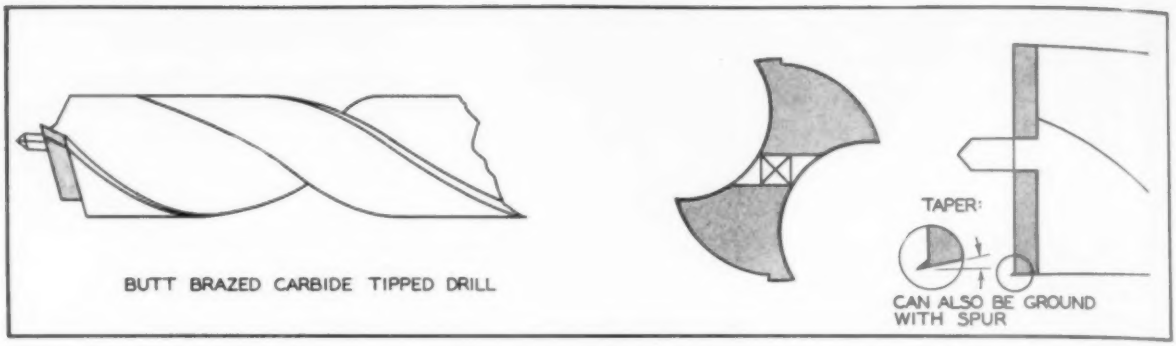


Fig. 7. Butt-brazed carbide-tipped drill.

brazing to minimize the amount of rigid diamond wheel grinding. These cutters have shown resistance to heavy impact loads and can withstand heavy feeds and speeds. The small pocket shown in Fig. 6 is for locating the tip during brazing. The saw slots are to help relieve brazing strains.

In Fig. 7 is shown a butt-brazed drill which has proved to be successful for drilling plastics, hard compositions, wood and sheet metal with a wood backing. The carbide is brazed onto a hardened high-speed steel drill and finished. The center point of HSS enables the tool to penetrate and remain vibrationless. A 0.003-0.005 in. per in. back taper is desirable. If brazed correctly, the carbide will not break away from the shank.

Rough Grinding and Undercutting

Two suggestions for reducing the amount of carbide cracking during tool fabrication are rough grinding the carbide and undercutting. When a large amount of carbide is to be ground away in roughing after brazing, rough out the carbide to form or shape before brazing. A simple holding device can be made for this purpose which will also result in some time savings, since some of the care and caution necessary after brazing can be ignored. Brazing will also be easier if the clearance angles have been ground into the carbide beforehand. With less overhang the carbide is less likely to crack during cooling. After it has been brazed, the tool can be ground complete on a diamond wheel.

A method of relieving form tools which are liable to crack, and to remove much of the brazing strain, is shown in Fig. 8. This undercutting, which removes the strain from the formed carbide at its weakest point, can be used on many different types of tools or shapes.

Tools which can be reground only a limited number of times on the rake surface, such as an end mill, can be improved by using the design shown in Fig. 9.

The designs and ideas presented here have been sketched very briefly to show what can be done by further investigation and development of the methods and techniques for butt brazing tools. While most of these instances have been worked out for particular production problems, the results are indicative of general increases in tool life, time savings and tool cost reductions.

Fig. 8. Undercutting relieves strain on carbide.

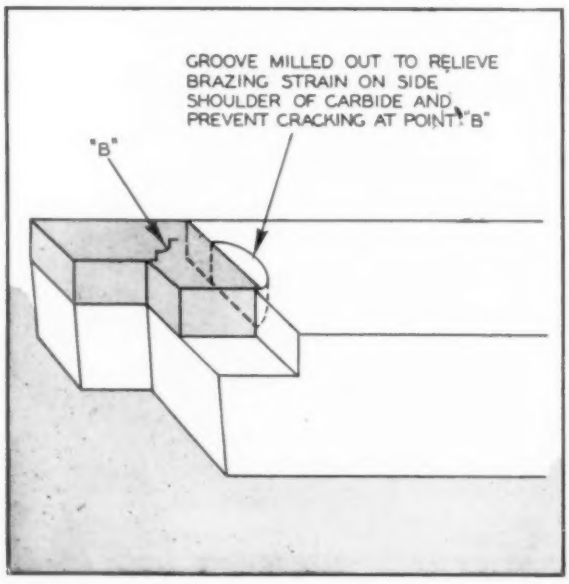
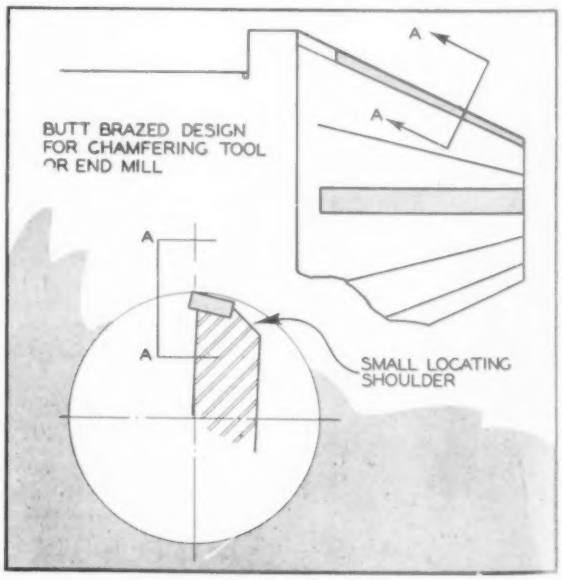


Fig. 9. Design for increasing number of regrinds.



Analysis of Process Improvements

By Frank M. Butrick, Jr.

VOLUMES HAVE BEEN written about better methods, tooling improvements, machine replacement systems, and the application of employee suggestions. Yet, while the larger firms have made systematic application of the principles of planned process improvement, the average small or medium shop employing 500 persons or less has practically neglected the field. One of the principal drawbacks in such shops is the lack of trained personnel capable of making the proper studies and the lack of comprehension on the part of the responsible executives of the value of such studies.

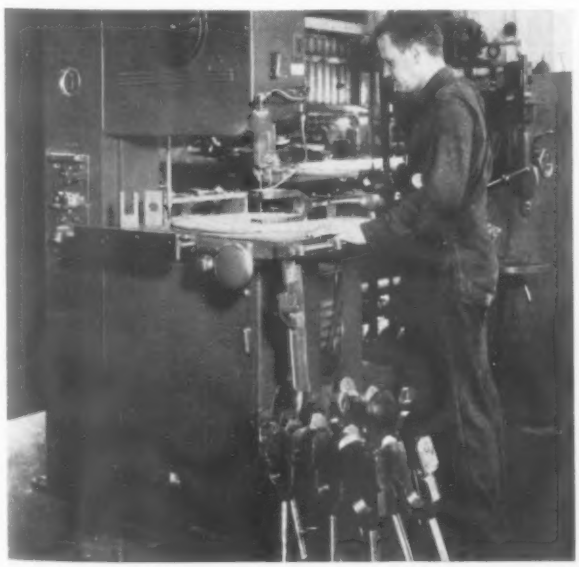
Normally the job of approving process improvements and machine replacements is left to the plant superintendent or the works manager, and recommendations are approved according to his personal experience or opinions, or those of the department heads concerned. Actually, all contemplated improvements or changes of any nature concerning the manufacturing processes should be carefully investigated before final approval or rejection. In practice, small or trivial matters are judged by experience, or perhaps trial and error, yet a systematic study will frequently reveal many hidden advantages or disadvantages of a new method, and in terms of dollars and cents which administrative personnel can readily appreciate.

There are a few simple basic steps in an objective study of a proposed improvement, whether it is a tooling change, handling change or machine change. To obtain lucid figures and to present them to the best advantage, the reason, advantages and disadvantages, and possible profit or loss resulting from the change should be carefully analysed.

Obviously, if an improvement is under consideration, then something is wrong with the operation in its present state. To correct this, it must be determined what part of the operation is at fault—material, method, tooling, machine or operator. Once the sore spot has been located, the best procedure is to study all possible solutions and choose the best on the basis of cost and returns.

The first step in any study is a careful, detailed analysis of the operation in its present form. A complete time study should be made of the operation as a whole, and the time for handling, loading,

Fig. 1 (left). A diesel manufacturer found that he could save seven hours in cutting a forged alloy steel connecting rod on a band saw instead of using a milling machine. Fig. 2 (right). The die head shown here cut production time by 97 percent over single-tool threading of Acme-threaded stud.



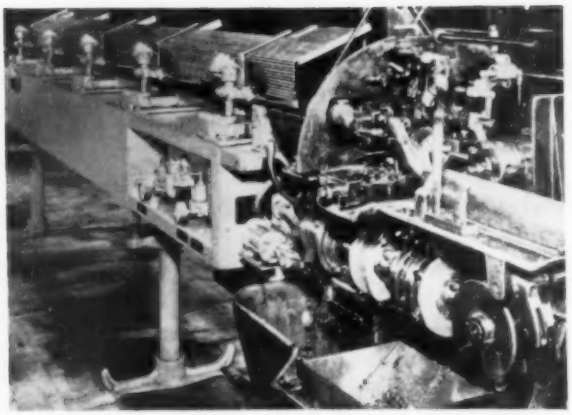


Fig. 3. This air-operated automatic magazine loading bar feed for a screw machine produced a net gain in running time of 78 percent over manual feed. Changeover time from job to job is less than 30 minutes in most cases.

machining, and so on, studied separately. Once the steps of each operation have been isolated and studied as individual units, it is a comparatively simple matter to determine which steps are eliminated, shortened or corrected by each suggested change. The savings in time per piece for each proposal is then readily calculated, and with the labor and overhead costs at hand, it is a simple matter to compare the savings for each method against the cost of the change required and thus choose the most economical solution.

In this way, the average supervisor or foreman can study his own ideas, proposals by associates, offers by salesmen or suggestions by employees, and offer those which appear to be profitable to the proper authority, with that profit expressed in terms of dollars and hours.

The largest single factor in the cost of any manufactured item is the overhead. Overhead is a term which is used and misused to an alarming degree. The easiest way to pin down overhead is to divide it into its various components.

Of first interest is the machine cost per hour. This consists of the sum of the yearly amortization on the machine and its tooling or accessories, interest on the investment in the machine, cost of the tools used and sharpened per year, maintenance and repairs and the power cost. The total yearly cost is divided by the hours of use during the year.

Although plant cost is usually at best only a rough approximation, it should be calculated nonetheless. It follows the same general pattern as machine cost, consisting of the sum of the yearly amortization or rent on the buildings and office and stockroom furniture plus the cost of maintenance, heat, light, water, etc.; the whole to be divided by the percentage of floor space required by the particular operation under consideration and the storage and aisle space relating to it. This in turn is divided by the hours of work on the job per year. Dollars and cents arrived at give the approximate building use cost.

The third part of overhead is material cost and handling charges. To the cost of the material per piece is added the shipping charges, the cost of handling the stock through receiving, inspection, and to the operation, inspection of the finished work and handling through stockroom and shipping departments, storage, or to the next operation. The cost of stockroom and inspection equipment should either be applied here or in the building overhead.

Sometimes the cost of inspectors and shipping and stockroom employees is merely added to the non-productive labor burden. While this method is easier, results are not as accurate because singling out each department's share is then nearly impossible since not all will require the same amount of inspection and handling time. Also, when studying one operation at a time, the cost of handling and applicable inspection should be applied to the first operation. Then the net material cost for each operation is the entire cost of the preceding operation, and the handling and inspection cost is figured in only if, and as much as, it occurs between the operations.

The total cost per piece, then, is a sum of the machine cost, building cost, material cost, direct labor cost, and non-productive labor cost. The direct labor cost should include an allowance for bonus or incentive plans, overtime pay, vacations, insurance and so on. Only the cost of personnel not applied in the material overhead should be counted in the non-productive labor cost. This normally consists of supervisory, clerical, administrative and executive personnel; the cost of such departments as sales and engineering, and plant service personnel such as building maintenance men, janitors, floor sweepers and so on.

This data will give anyone with sufficient energy and authority to collect it an actual cost for any item in the manufacturing line. It is realized that it is impossible for the average superintendent to have access to accurate figures on all this information. In fact, it is a rare organization which knows as much about itself as the possessor of this information would. However, even wild guesses at individual segments of the overhead picture will add up to a far more accurate figure than will the usual 200 to 300 percent burden guess commonly employed.

Here is an example of how a careful estimate of these costs can reveal useful and sometimes surprising results. A midwestern manufacturer used a 4-in. and a 2-in. washer in an automotive subassembly. The 4-in. washer was blanked and pierced in the plant while the smaller plain washer was purchased from a supplier. During a shortage in the vendor's supplies, a die was purchased to

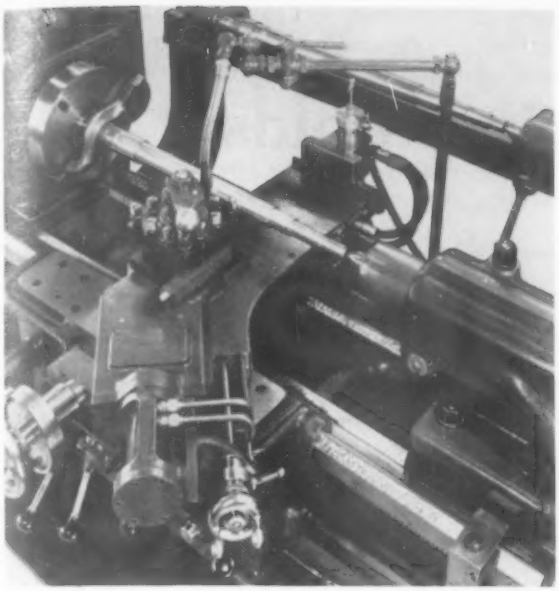


Fig. 4. Tests made with sample runs on this duplicator lathe revealed possible savings of more than $4.00 each on the shaft shown being machined.

blank the smaller washer in a zig-zag line from the wide stock bought for the larger washer. When the shortage had passed, the die was set aside and the washer was again purchased outside.

The unused die was spotted one day by an inquisitive process man who made a study which revealed two conclusions: first, even under the existing method of operation, it was less expensive to make the part than to buy it; and second, considerable savings would result by buying proper size stock to blank the part in a straight line, using a simple stop on the die. (Previously the part had been located by eye.)

The analysis follows:

	Existing set-up	Proposed set-up
Pieces produced per hour	1000	2000
Material size, strip for 10 pcs.	90.75 sq. in.	62.625 sq. in.
Cost for material, per piece	$0.0277	$0.0192
Material inspection and handling	.0014	.0014
Machine and die use and maintenance (20c per hr)	.0002	.0001
Building and maintenance	.0001	.00005
Labor cost, direct, for 2 men	.0028	.0014
Non-productive labor (150 percent)	.0042	.0021
Total Cost Per Piece	.0364	.02425

The savings per piece with proper size stock amounted to 0.01215¢. Since the purchased price per piece was 0.054¢, the monthly savings on 12,000 pieces amounted to $357. The total cost of the die was only $260. Even if the shop had not had the die at the time, the purchase of one would have been an extremely good investment, since the cost of the die would have been returned in about three weeks.

This type of study is a natural for estimating savings to be gained by complete tooling changes. The superintendent of a shop making cast iron gears with two holes drilled and tapped in each one had long tried to convince his purchasing department of the soundness of replacing the old hand-feed drill press with a power-fed machine with a 2-spindle drill head adjusted for the various models of gears run, and equipped with a simple sliding jig instead of the old box-type jig. Here the study dealt with time savings, so the breakdown was by segments of the operation.

	Existing set-up	Proposed set-up
Carry work to jig (seconds per pc.)	1.66	1.66
Load and lock jig	3.66	1.83
Move jig, drill first hole	10.42	10.32
Move jig, drill second hole	9.59	eliminated
Withdraw and unlock jig	2.51	1.25
Carry away finished piece	2.88	2.88
Total Time Per Piece	30.72	17.94

Time savings from the proposed tooling amounted to 12.78 seconds per piece or 3.55 hours per thousand. The job cost per hour amounted to: direct labor, $1.40; non-productive, $2.10; machine and building, $0.10; or a total of $3.60 per hour. The total savings on a thousand pieces then amounted to $12.78.

The total cost of the suggested improvements was $894.00. With a monthly production of 20,000 pieces, the savings with the proposed set-up would amount to $255.60. The investment would be returned after only 3½ months. A similar study was made on the tapping operation. The two revealed possible savings of over $550.00 per month.

The wide-awake idea man can prove or disprove all his theories by this method of calculating possible savings. It is a sure way of convincing the purchasing department of the advantages to be gained by purchasing new equipment, or of talking the toolroom foreman into improving some of the fixtures in use. A systematic savings calculation plan can be applied to new machines, new methods, new tooling, new materials, new handling—anything, even to comparisons between repairing old equipment and buying new.

ERRATUM

On page 39 of the October, 1951, issue, the value given for v_b in reference to Fig. 7 should read 147,600 fpm.

Cast Production Molds

By John Starr

DURING THE PAST FIVE years, high operating costs in virtually all industries have caused a steadily-growing demand for less expensive tooling for the molding of plastics, rubber, leather, and many other materials in small or moderately large quantities.

The demand for low-cost tooling has been especially great in the western states, where small industries are predominant; and, in this connection, it is interesting to note that, while many new types of tooling have been experimentally developed for western manufacturers, metal molds, made with more or less standard foundry casting facilities, are now meeting a majority of these production requirements.

Generally speaking, the techniques involved in casting metal production molds are the same as processes which have been used to cast other metal products for many years. However, a number of variations have been evolved for the purpose of increasing both the quality and quantity of tooling that could be cast.

Fig. 1. Cast-metal tooling, such as the compression mold for plastics pictured here, costs much less than machined or hobbed cavities. Yet, where limited production runs are specified, it can have all the fine details required to manufacture top-quality products.

Patterns

Patterns are made from most conventional materials, and may be provided either by the customer or the pattern shop in each individual foundry.

Foundry facilities are normally used to make patterns from dimensionally accurate mockups or models provided by the customer, when the latter lacks the services of appropriately trained tool designers and patternmakers, as follows:

(1) By splash-casting plaster or plastic compounds to produce requisite cavity patterns on the mockups or models.

(2) By hand-pressing heat-softened thermoplastics over various surfaces of the mockups or models so that the pattern materials will cool and solidify as cavity patterns.

(3) By making a flexible mold on a mockup or model so that duplicate models can be cast for use in making patterns for multi-cavity metal molds.

(4) By masking a model so that a metal cavity pattern can be produced as a metallized "strip coating" thereon, after which the pattern may be used like a plaster pattern or imbedded in sand so that it can be reinforced with cast alloys to serve as part of the finished tool.

(5) By casting wax, thermoplastics, or low-melt alloys so as to produce investment patterns on mockups or models.

If a mockup or model is dimensionally accurate, shrinkage can usually be computed in accordance with the properties of a pattern material and the alloy to be used for casting purposes. However, it is sometimes desirable to make further allowances for "after shrinkage" or similar phenomena which characterize plastics and other materials molded with cast-alloy tooling.

A slight allover draft is usually desirable in

making patterns, and a $\frac{1}{16}$-in. allowance is usually made for a finish on each side or end of a casting, as well as on the face, unless the cast has an irregular parting line.

No allowance is normally made for machining a force along its parting line, although a small bead may be produced for machining purposes around the edges of a cavity with an irregular parting line.

In many circumstances, it is desirable to make use of "master patterns" of refractory-type plasters, since these can be provided with metal retaining forms for use as molds in which several duplicate casts can be produced. The retaining forms or flasks may have any shape required to fit snugly around the edges of the patterns, and each should be made from steel sheet or plate materials so that it will be rigid as casts are made, yet easy to disassemble after casts are solidified.

Height of a pattern frame should be at least $\frac{3}{16}$ in. greater than the height of a cast to be made therein, so that the cast can be cut and machined to accurate finish dimensions at its base. Frame walls are of uniform thicknesses, ranging up to about $\frac{1}{2}$ in., as a rule, and may be reinforced with ribs to resist forces created by on-center centrifugal casting.

Where pattern-frame molds are utilized, it is frequently possible to avoid the fabrication of match-plate patterns by casting a sequence of identical cavities so that the latter can later be welded or otherwise assembled to provide a multi-cavity mold for production work.

Molds

Both green and dry sand molds have been successfully used to make short-run tooling and fairly long-lived cavities for production work not requiring the use of high molding temperatures or pressures (e.g., in laminating glass-fiber materials with clear or pigmented polyester resins). However, other types of molds are preferable when tooling must be cast for optimum strength and durability, since it is possible to attain the most desirable granular structure in cast alloys by:

(1) Maintaining the cast metals in a molten condition long enough to permit the effective use of on-center centrifugal forces, as suggested previously.

(2) Casting the alloys in investment molds via an off-center centrifuge.

(3) Withdrawing air through the pores of a plaster mold constituent by means of a vacuum attachment.

(4) Applying mechanical, pneumatic or hydraulic pressure in comparatively low increments to metal casts during the solidification process.

Of these processing methods, the first seems to be most practical for molds of all sizes. However,

Fig. 2. Dies made by sand-casting low-melt alloys are used, as shown here, to stamp both ferrous and nonferrous sheet stock.

all of the remaining three techniques have been used with success by various foundries in different circumstances.

Molds for tooling casts may be cored for many functional purposes (e.g., to provide a means of using steam heat to solidify thermosetting plastics and rubber). It is rarely desirable however, to reduce the weight of a tooling cast through the use of cores; and in many circumstances it is preferable to produce small openings by machining the solidified cast.

Specific rules which have been adopted with reference to the coring of molds for stainless steel tooling casts are at least typical of the rules that should be observed in making all types of cast-alloy tooling, and may be summarized as follows:

(1) If the cast is no more than $\frac{1}{2}$ in. thick and 4 in. square, and if the cavity is no more than $\frac{1}{4}$ in. deep, a casting should be produced without back coring.

(2) If the cast is about $\frac{1}{2}$ in. thick and should have corresponding forces cored from the back to provide a uniform wall, the back coring may be ribbed on 1-in. centers and a 5-deg draft should be allowed for the coring on one side and on all surfaces.

(3) If the cast has a normal or deep cavity and a more or less uniform wall ($\frac{1}{2}$-in. maximum) on all side and bottom areas, the bottom should not be cored out, although the corresponding force should be cored and ribbed from the back.

(4) If the cast has a spherical or cylindrical cavity shape, back coring should be used and forces (being self-supporting) need not be cross-ribbed.

(5) If a cavity has one or two open ends, the cast may be made with a temporary wall at each

Table I—Comparative Properties of Tool-Casting Alloys

Properties	Compositions of Alloys				
	Pb, Bi	Al, Zn	Fe, Cr	Be, Cu	Fe, Cr, Ni, Co, etc.
Molten Temperature Range, deg F	100-600	600-1000	2000 & up	1000 & up	Over 2000
Specific Gravity (Average)	11.38	6.7	8.0	9.0	10.0
Tensile Strength (Annealed), psi	13000	40000	74000	70000	95000
Brinell Hardness	19	100	200	350	450
Impact Strength	——	4*	40**	9*	7*
Conductivity (Heat or Elec.)	Low	Fair	Good	High	Good
As-cast Machinability	Excellent	Good	Fair	Good	Difficult
Heat Treatability	Nil	Slight	Good	Good	Excellent
Shrinkage after Casting	Slight	Slight	High	Moderate	High

* Determined by Charpy Impact Test
** Determined by Izod Impact Test

open end and the wall may be cut off after casting; or, if dimensional specifications permit, two or more open-end cavities may be cast end-to-end and later separated by cutting.

(6) If the parting lines of a cavity must be irregular, the casting should be back-cored and cross-ribbed on 1-in. centers.

(7) If the length of a force must be greater than the product of the length and diameter of a casting, the force should have a hole through its small end to provide a support for back coring.

The forces mentioned in the foregoing rules are machine-mold constituents whose purpose is to enter a cavity block so as to exert pressure on a molding compound.

Alloys for Tool Casts

Virtually all castable metals may be regarded as potential alloys for industrial tooling casts. The general types indicated in Table I are believed to be most adaptable to a majority of applications and their selection in each case can usually be determined in conformity with one or more of the following qualifications:

(1) Where low cost alone is the most important requirement, alloys such as antimonial lead can be cast and finished with optimum ease due to their comparatively low melting temperatures, softness, etc.

(2) Where a combination of light weight and durability is essential to the rapid completion of a short or moderate production run, aluminum-alloy casts can be easily handled and will meet most molding temperature-pressure requirements without greatly exceeding the cost of low-melt alloy casts.

(3) Where cast molds should yield products of maximum smoothness or without loss of small details during rather long production runs, stainless steel and beryllium-copper alloys both have good casting characteristics plus high resistance to wear and corrosion. As a rule, stainless steel tooling will have the most mechanical strength; but beryllium-copper is often preferable due to low porosity, a comparative lack of brittleness, and exceptional resistance to wear and corrosive chemicals (such as the acids and solvents which are frequently compounded in inorganic molding materials).

(4) Where maximum productivity is the principal tooling requirement, casts made with super-steel alloys may be essentially as good as hobbed steel cavities. However, molds made with super-steels are normally regarded as most practical for die casting, where there is a more specific need for high mechanical strength and chemical inertness at elevated temperatures. Less expensive tooling can meet most of the requirements for cast-metal cavities in molding rubber, plastics, leather, etc.

Alloys for cast-metal tooling are melted and otherwise processed in accordance with conventional foundry practices for optimum homogeneity and minimum grain size; and, whenever possible, it is desirable to select materials and processing methods so that resultant molds will exceed maximum production requirements by a margin of about 30 percent.

In many circumstances, mating tools for mold cavities have been cast without the use of separate patterns by using the cavities themselves as casting-mold units. This normally involves facing the cavity unit with a refractory compound (such as a paste made with fireclay) and erecting a flask-like retainer for the cavity so that alloys

Fig. 3. Cross-sectional side view of a typical cast-alloy mold in which pneumatic pressure is used to fabricate thermoplastics as bottles and other hollow articles.

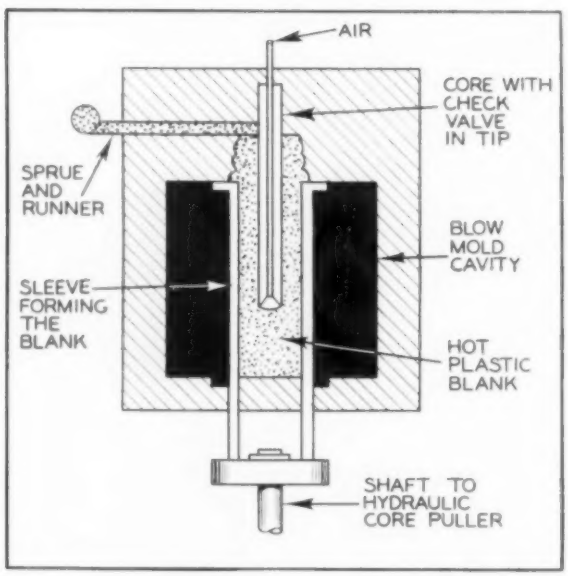


Fig. 4. In some cases, cast-alloy tools may be satisfactorily used in mass production work —for example, as dies for the extrusion of natural and synthetic rubber tubes.

can be cast without damaging the cavity to requisite mating-tool dimensions. Tooling thus produced may be made of identical metals or two different alloys.

Finishing

As-cast production tooling, if not made with soft or low-melt alloys, is usually annealed to facilitate finishing operations; and, when shop facilities are available, finishing may be done either by the customer or by the foundry.

Finishing operations include:

(1) The repair of small blowholes or similar defects, if allowable (as in the sand-casting of rough tooling for use in fabricating experimental models or prototypes). This may involve filling-in with metal-spray or welding equipment, grinding to remove protuberances, or eliminating warpage by applying pressure to a preheated cast.

(2) The cutting of gates, sprues, and other details or critical dimensions which cannot be conveniently or accurately cast in metal tooling. This involves the use of lathes, shapers, milling machines, drills, etc., the same as would be necessary in finishing casts for nontooling purposes.

(3) The assembly of casts by welding or a comparable technique, if necessary, in the production of multi-cavity molds.

(4) The heat treatment of casts, if necessary, for maximum physical properties.

(5) The buffing, honing, or plating of cast-metal surfaces so that the latter will be smooth enough for production usage.

The last of these operations is particularly important, and should merit careful consideration even before cast tools are produced, because the usefulness of most production molds is directly proportional to the amount of work that must be done to finish the products which are molded therein.

For example, plastic moldings should acquire surfaces of finished smoothness from the cavities in which they are produced (so that nothing more than flash or extraneous materials must be removed before the moldings are ready for use) since machining costs might otherwise increase the price per mold to a prohibitive sum.

All of the castable alloys heretofore mentioned can be finished with grinding, polishing or honing equipment for most production-mold purposes. However, the cost of such finishing may be excessive if mirror-smoothness is required, and resultant cavity dimensions might not be within close-tolerance specifications.

Therefore, it is a rather common practice to electroplate cast-mold cavities with chromium, cadmium, silver, zinc or some other metal which provides a glossy finish with suitable hardness. Such plating can be accurately applied for considerable durability in layers which are no more than 0.0003 in. to 0.0005 in. thick at a comparatively low cost, even if the work is done by a specialized subcontractor; and, in addition to providing an extremely-bright tooling finish, the deposition metals will shield a cast-mold cavity so that the latter can be used for more than a predetermined quota of production (since worn plating can be removed and replaced for much less than the cost of a new production tool).

While it must be acknowledged that cast alloys lack some of the desirable qualities of wrought products, the low cost of cast-metal tooling is a factor which should be carefully evaluated before disadvantages in the form of comparative physical properties can be perceived in true perspective.

For example, where a standard tool-steel production mold with 8x8x10-in. dimensions would cost at least $10,000 if machined, or $6500 if hobbed, a stainless-steel mold of the same dimensions can be cast at a cost of less than $100 and readied for production work at an additional expenditure which should rarely exceed $200.

One mold of the latter type has been used to produce approximately 500,000 leather packings at a total tooling cost of less than $\frac{1}{17}$¢ per unit, after which the mold had to be discarded.

If comparable work had been done with a machined-steel mold, the tooling cost for a million identical leather packings would have been 1¢ per unit—at which rate, more than 50 percent could still have been saved through the use of duplicate tool castings. The cost of machined-steel cavities could have been reduced at least 30 percent through the use of hobbed-steel cavities, but even then more than three million packings would have been required before the use of cast-alloy tooling would have been economically impractical.

ACKNOWLEDGMENT

For much of the data in the foregoing article, the writer is indebted to W. S. Harmon of Process Mold Co.; J. A. Kavanaugh of Standard Tool Co.; W. G. Harvey of Stainless Cavity Corp.; R. H. Osbrink of Osbrink Manufacturing Co.; and Adrian Reynolds of Intracast Co.

Calculating Mongrel Gear Centers Using Properties of Circles and Hyperbolas

By Zbigniew Jania

ALPHA ENGINEERING COMPANY

WHEN DESIGNING special machinery, cases occur where it is necessary to mate a single gear with three other gears whose pitch diameters and centers are known. The problem consists of determining the coordinates of the center and the pitch diameter of the fourth mating or mongrel gear.

The problem can have the following three variations: all three gears are of equal *PD;* two of the known gears are of the same *PD;* all three gears have different *PD's.*

In Fig. 1 is shown a diagram typical of a problem representing the first case where all three gears are of equal *PD.* As shown here, the *PD's* and the coordinates of gears *A, B* and *C* are known and fixed with respect to axes *X, Y. Q* is the center of the mongrel gear whose dimensions and location with respect to *X* and *Y* will be determined.

The solution to the problem can be obtained by setting up the equations of the two straight lines and solving these equations simultaneously to obtain the coordinates, x and y, of the center of the circle tangent to *A, B* and *C.* These two straight lines will be the radical axes of *A* and *B,* and *B* and *C* respectively, since the circles are equal.

The equation of the form:

$$x^2 + y^2 + 2gx + 2fy + d = 0$$

represents a circle of radius $\sqrt{g^2 + f^2 - d}$ with the center $(-g, -f)$.

The equations of *A, B* and *C* therefore are:

(A) $x^2 + y^2 + 2g_1x + 2f_1y + d_1 = 0$

(B) $x^2 + y^2 + 2g_2x + 2f_2y + d_2 = 0$

(C) $x^2 + y^2 + 2g_3x + 2f_3y + d_3 = 0$

Now the radical axis of *A* and *B* is a straight line and is given by the equation:

$$2(g_1 - g_2)x + 2(f_1 - f_2)y + d_1 - d_2 = 0 \qquad (1)$$

Similarly the radical axis of *B* and *C* is given by:

$$2(g_2 - g_3)x + 2(f_2 - f_3)y + d_2 - d_3 = 0 \qquad (2)$$

The values of d_1, d_2 and d_3 are given by:

$$d_1 = g^2_1 + f^2_1 - r^2_1$$
$$= 3.66^2 + 3.96^2 - 1.5^2 = 26.8272$$
$$d_2 = g^2_2 + f^2_2 - r^2_2$$
$$= 4.4^2 + 0 - 1.5^2 = 17.11$$
$$d_3 = g^2_3 + f^2_3 - r^2_3$$
$$= 10.00^2 + 0.36^2 - 1.5^2 = 97.8796$$

Let

$2(g_1 - g_2) = a_1 = 2(4.4 - 3.66) = 1.48$

$2(g_2 - g_3) = a_2 = 2(10.0 - 4.40) = 11.20$

$2(f_1 - f_2) = b_1 = 2(0.0 - 3.96) = -7.92$

$2(f_2 - f_3) = b_2 = 2(0.0 - 0.36) = -0.72$

$d_1 - d_2 = c_1 = 26.8272 - 17.11 = 9.7172$

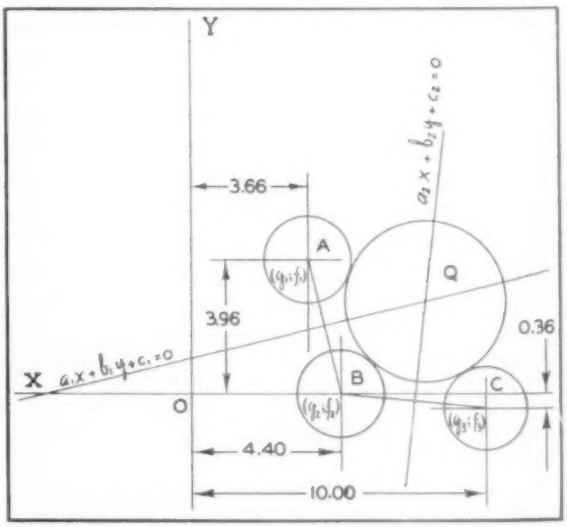
$d_2 - d_3 = c_2 = 17.1100 - 97.8796 = -80.7696$

The equations (1) and (2) now become:

$$a_1 x + b_1 y + c_1 = 0 \qquad (1a)$$
$$a_2 x + b_2 y + c_2 = 0 \qquad (2a)$$

These may be solved in the usual way by elimina-

Fig. 1. Diagram showing a typical problem when all three mating gears are of equal *PD.*



tion of the variables, or their solution may be conveniently written in the determinant form, thus:

$$\frac{x}{\begin{vmatrix} c_1 & b_1 \\ c_2 & b_2 \end{vmatrix}} = \frac{y}{\begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix}} = \frac{-1}{\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix}}$$

$$\frac{x}{-646.6916} = \frac{-1}{87.7384}; \quad 7.3707 = x$$

$$\frac{y}{-228.371648} = \frac{-1}{87.7384}; \quad 2.6029 = y$$

The PD of the mongrel gear is found as follows:

$$\sqrt{(5.96 - 2.6029)^2 + (7.3707 - 3.66)^2} = 3.952$$

Therefore the PD of the mongrel is,

$$2(3.952 - 1.5) = 4.904$$

Illustrated in Fig. 2 is a solution to the second case where two of the known gears are of equal PD.

One of the fundamental properties of a hyperbola is that the difference of the focal distances of a point on the curve is constant and is equal to the transverse axis. It is easily verified that this condition is satisfied by the locus of the family of circles tangent to A and C. The coordinates of the mongrel gear will therefore lie on the point of intersection of the hyperbola and the straight line which is the locus of the family of circles tangent to A and B.

Both equations, that of the hyperbola and that of the straight line, will first be determined with respect to the coordinate system, X Y with respect to O'.

From the data given in the diagram:

$$FF' = \sqrt{5.9780509^2 + 3.1803142^2} = 6.7713729$$
$$\alpha = \tan^{-1} FP/F'P = \tan^{-1} 0.5319985 = 28^\circ\ 0'\ 46''$$
$$FO' = F'O' = FF'/2 = 3.3856864$$
$$PT = TF' = F'P/2 = 1.5901571$$
$$d = \tfrac{1}{2}(7.9428432 + 3.1803142) = 5.5615787$$
$$FO = d - FP = 2.3812645$$

Now, the equation of the hyperbola is

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$

where

$$\text{transverse axis} = 2a = F'W - FW = r_O - r_A$$
$$2.55 - 1.75 = 0.8000000$$
$$a = 0.4000000 \text{ and } a^2 = 0.1600000$$
$$\text{also } O'F = O'F' = \sqrt{a^2 + b^2}$$
$$\text{therefore } b^2 = (O'F)^2 - a^2$$
$$= 3.3856864^2 - 0.1600000 = 11.3028727$$

Now the equation of the straight line with respect to the origin O' is:

$$y = mx + c$$
$$\text{where } m = \tan \alpha = 0.5319985$$

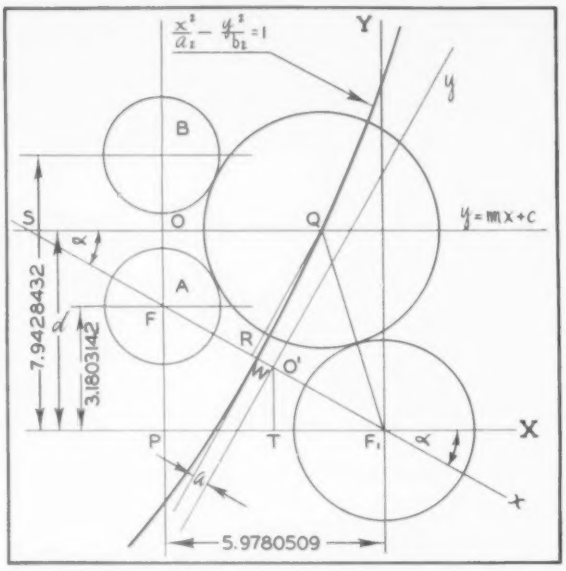


Fig. 2. In this problem, two of the mating gears are of equal PD.

The intercept on y axis, c, is found in the following manner:

$$FS = OF/\sin \alpha = 2.3812640/0.4966850$$
$$= 5.0700962$$
$$\text{now, when } x = -(FS + FO'),\ y = O$$
$$\text{therefore, } c = (FS + FO')m$$
$$= 8.4557883 \times 0.5319985$$
$$= 4.4984637$$

The explicit form of the equation of the hyperbola is:

$$y = b/a \sqrt{x^2 - a^2}$$

Equating this to the equation of the straight line:

$$mx + c = b/a \sqrt{x^2 - a^2}$$
$$m^2 x^2 + 2mcx + c^2 = b^2 x^2/a^2 - b^2$$
$$\text{or} \quad x^2 (m^2 - b^2/a^2) + 2mcx + c^2 + b^2 = 0$$

This is a quadratic in x with the coefficients:

$$A = m^2 - b^2/a^2 = -70.3599322$$
$$B = 2mc = 4.7863519$$
$$C = b^2 + c^2 = 31.5390485$$

The solution of this equation is:

$$\frac{-B \pm \sqrt{B^2 - 4AC}}{2A}$$
$$= \frac{-4.7863518 \pm \sqrt{8899.250420}}{-140.7198644}$$
$$x = -0.6363671 \text{ or } 0.7043937$$

The positive root of this equation is rejected since it gives the abscissa of the point of intersection of the straight line and hyperbola on the positive x

(Continued on page 48)

Machine Tool Origins

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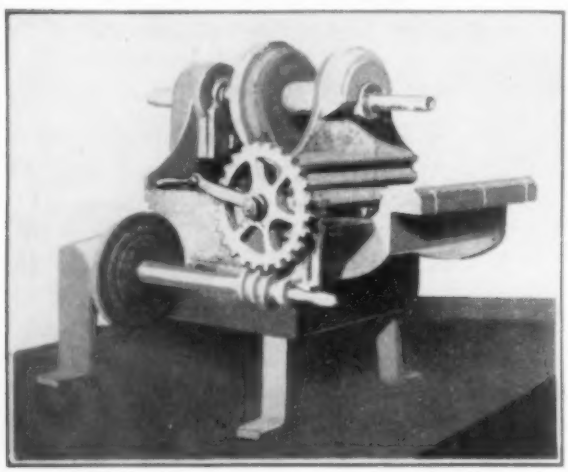
Part II

SUBSTANTIALLY ALL of the basic machine tools were realities by the year 1850. The majority of them saw their beginning around the turn of the nineteenth century. The genuine development started about the year 1800 and grew at an accelerated pace until the middle of that century. From then onward, that is to say, in the past century, progress in machine tools has continued with emphasis on functionality. It is entirely correct to state that the evolution of machine tools during the last hundred years has been just as spectacular and has shown ingenuity of an order equaling or surpassing that displayed by their originators.

Undoubtedly the stimulant that caused the remarkable machine tool beginnings was the advent of the Industrial Revolution. The transferance of skill from manual dexterity to the machine that identified this epoch, can correctly be credited with having furnished the needed impetus to the artisans of that day for new methods and means of performing work of a character and at a speed never before considered either necessary or possible. The previously cited example of boring cylinders for Watt's steam engine was multiplied by the requirements of the genius of Crompton, Arkwright, Fulton, and Eli Whitney among others. These inventors and their colleagues posed the problem of building mechanical equipment capable of accuracy and long life. Here were two novel requirements—equipment was to be constructed from metal and it must be of a character that bordered on precision.

Fig. 3. Eli Whitney's milling machine. From *English and American Tool Builders*, Yale University Press, Joseph W. Roe.



It may be arduous for us to grasp the complete significance of this dual requirement. There is no contemporary parallel. The fruition of the atomic bomb project might be suggested as a program bearing some similarity to the challenge posed by the events spawned by the Industrial Revolution.

Regardless of our conjectures about this episode, there were men of the necessary stature to meet these new demands. Machine tools were designed and constructed that met every contingency. The majority of the machine-tool development occurred in England although America was not remiss in its obligations. The metal planer was developed in England in about the same year, 1818, that Eli Whitney, in America, built the first milling machine, which rests in Towne museum today. He developed this machine as a segment of the necessary tooling for his interchangeability of parts program on a federal contract for supplying muskets to the army. The index milling machine invented by Maudslay in England appeared in 1829. However, approximately 30 years elapsed before the universal milling machine was invented by Brown in Providence, R. I. Fig. 4, showing Whitney's original milling machine, gives striking evidence that its basic features are retained on current designs.

A chronicle of all machine tool inventions is beyond the scope of this treatise. Yet, it is a matter of record that the initial efforts in machine-tool building were made in England with America contributing in a major way. The machine tools of early vintage have been improved and revised since

their inception largely by American ingenuity. This statement is not to be taken as disparaging the splendid efforts of France, Switzerland, Germany, England, and Scandanavia—they are continuing with the progress in machine tools. However, America has the largest engineering manufacturing industries and, in consequence, the major market for machine tools.

Personalities and Machine Tools

It is an impossibility to pay deserved homage to the great and the obscure who, taken together, provided society with machine tools. The early inventors stemmed from such diversified backgrounds as clerks and blacksmiths. It would be unfair to honor one of these men above all his fellows; yet Henry Maudslay who rose from the job of powder monkey in an arsenal to a position of eminence as an inventor and builder of machine tools, qualifies as an outstanding personage in his field.

In America, Eli Whitney's achievements rank him high among a distinguished group that must include Thomas Blanchard, Samuel Slater, and Seimeon North as the pioneers of our machine tool industry. These men were followed in increasing numbers by others who carried the industry forward. It is interesting to note that many of the latter gave their names to companies that continue to carry on the splendid traditions of the predecessors. An accurate listing of their names would constitute an impressive roll of honor. Samuel Colt, Francis A. Pratt, Amos Whitney, Frederick W. Howe, James Hartness, Lucius W. Pond, William Sellers, William B. Bement, Worcester R. Warner, Ambrose Swasey, John Steptoe, R. K. LeBlond, Henry Bickford, J. A. Fay, Frederick A. Geier, W. F. and John Barnes, Frederick M. Gardner, Charles H. Besly are names that will live forever in the machine tool industry.

Geographically, the industry started in New England but spread out as America was settled. Philadelphia became an early center for skilled workmanship and machine tool building. Cleveland and Cincinnati have a fine reputation as does Rockford and, to a lesser degree, Milwaukee. There are other cities that contribute their share of American-made machine tools. For the most part, though, the machine tool manufacturers remain at the site of their founding.

Fifty Years of Progress

The continuing trend of greater work load for the machine tool, with lessened effort required from the worker per unit of production, has characterized machine tool design trends during the past half century. Stated in different terms, improved machine tools make greater production per man hour possible. This statement is open to broad interpretations since machine tools have been improved in many directions, not merely with emphasis on production. Perhaps of even greater importance than increased production is the high degree of precision that present-day machine tools are capable of maintaining. This characteristic results from ruggedness built into the machine tool.

In order to visualize the transformation that has occurred in a basic type of machine tool, Figs. 4 and 5 are presented. The belt-driven milling machine was built in 1900 while the motor-driven one

Fig. 4 (left) shows a No. 2 Universal milling machine built about 1900, while Fig. 5 (right) pictures a No. 2 MI Universal milling machine built in 1950. The Cincinnati Milling Machine Co.

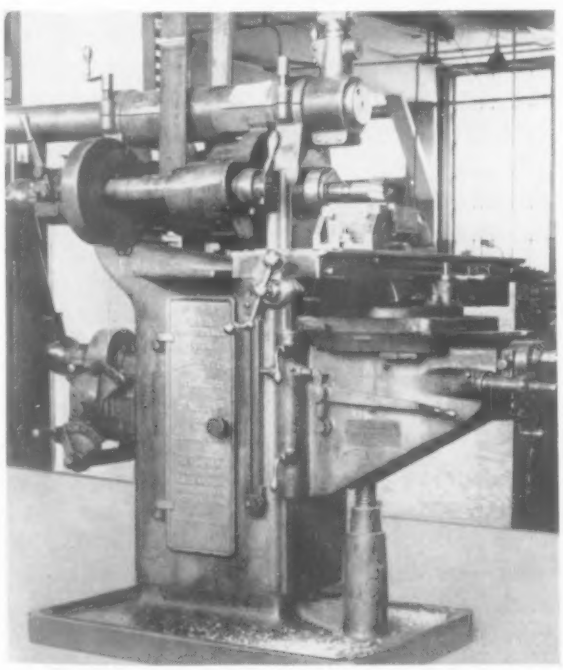


Table I—Comparison of Machine Tool Performances

Machine Tool	1926	1947	Time Saved	Projected Savings
LATHE Rough turn lathe spindle	Time on 1926 lathe 50 minutes	Time on 1947 lathe 33 minutes	17 minutes	13.6 hours per 40-hr. week. 102 days per 300-day year
PLANER Plane lathe carriage	Time on 1926 planer 50 minutes	Time on 1947 planer 28 minutes	22 minutes	17.6 hours per 40-hr. week. 132 days per 300-day year
MILLING MACHINE Mill gear case	Time on 1926 miller 50 minutes	Time on 1947 miller 35 minutes	15 minutes	12.4 hours per 40-hr. week. 93 days per 300-day year
RADIAL DRILL Drill—bore—ream headstock casting	Time on 1926 radial 50 minutes	Time on 1947 radial 33 minutes	17 minutes	13.6 hours per 40-hr. week. 102 days per 300-day year

Courtesy—The American Tool Works Co., Cincinnati, Ohio

is a current model of the same tool. Similar striking progress is found in every category of the basic machine tools and applies to every manufacturer in this field. Undoubtedly the next fifty years will witness a continuation of the improvement in machine tools that has been a characteristic of this industry since its inception. No stronger testimonial to the eminence of this industry can be given than is found in Table I. A study of that table epitomizes the profound achievement of the machine tool industry.

Machine tools have met every challenge that technological development has posed for them. They have improved from Wilkinson's boring machine, whose accuracy was bewildering to the artisans of Watt's day, in a degree whereby dimensional control in the sixth decimal place has been achieved. Every improvement in tooling material has been matched or surpassed by advanced machine tools. New power applications have been engineered into machine tool drives. Operating mechanisms have been revised as the need appeared. Power and operating controls that lessen worker fatigue and contribute to quality production are further advancements built into modern machine tools.

Above all, the capabilities of present day machine tools to produce more product with greater precision at lower unit cost is the enviable historical record belonging to this industry. The ingenuity, industry and determination of the machine tool builders is a reassuring combination that forecasts better living for society in the years ahead.

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The American Machinist

Machinery

Mechanical Engineering

The Tool Engineer

Calculating Mongrel Gear Centers

(Continued from page 45)

axis*. The ordinate of the center of the mongrel gear is obtained by substituting $x = -0.636371$ in the equation of the straight line.

Then:

$$y = -0.5319985 \times 0.6363671 + 4.4984637$$
$$= 4.1599174$$

The *PD* of the mongrel gear is found, as in case (1); the distance $F'Q$ can be evaluated from the triangle $F'QR$.

The PD is found to be 6.4726966

The coordinates of the mongrel gear may now be transferred to any convenient coordinate system by the use of the following transformation:

$$X = h + x\cos\alpha - y\sin\alpha$$
$$Y = k + x\sin\alpha + y\cos\alpha$$

where h and k are coordinates of O' with respect to some new origin and X and Y are coordinates of the gear center with respect to this new origin, and α is the angle which X makes with x.

*Not shown on diagram

The solution of the problem when the *PD* of all three gears is different would necessitate the solution of two hyperbolas for the point of intersection, which would give the coordinates of the center of the mongrel gear as in the previous cases. The situation, however, is complicated by the fact, that in general, it would be necessary to transform one of the hyperbolas to a common coordinate system—the solution for the point of intersection would then imply solving simultaneously two equations of the form:

(I) $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$
(II) $x^2/a^2 - y^2/b^2 = 1$

Equation (I) would be obtained by transforming the standard equation of a hyperbola using transformation formulas given above. The coefficients of x and y in (I) would include radicals, so that the solution of these equations would present some difficulties.

The problem may be solved with sufficient accuracy by drawing the two hyperbolas and thus determining their point of intersection. This would give approximate values of the center coordinates of the mongrel gear, which could then be established more accurately by a trial and error method.

Foreign Plants Retooled

By Werner G. Sprunger
SNYDER TOOL AND ENGINEERING COMPANY

CONTRARY TO THE general conception in this country that hydraulic electric machines are a novelty on the continent, the writer, found in each factory visited, on a trip through England, France and Italy, a relatively large percentage of personnel entirely familiar and experienced with this type of equipment. This is especially true at the Simca, Peugeot and Renault plants. The latter is building their own transfer type machine with what they call "self-contained" electric package units of their own design.

The Simca plant in Paris is modern in every respect, buildings as well as machinery. This plant is packed with American machine tools of both standard and special design. The Peugeot plant in Motbelliard, which was almost entirely destroyed by bombing during the war, has been rebuilt and re-equipped.

Many American machine tools can be seen in both the body and chassis divisions. The simplicity and effectiveness of their engine and chassis designs is impressive. Any tool engineer would notice that tolerances on machining operations are very often held much closer than what is considered general practice here. These tolerances are religiously adhered to, even though repeated machining passes are necessary. The visiting tool engineer would also be impressed by the unique operation sequence and checking devices used.

To describe only one unusual machining practice at the Peugeot plant, the writer was on hand when a special machine by Snyder was put into operation. This machine is a five-station, transfer-type, single-end boring machine for machining the cam and crankbores in the Peugeot cylinder blocks. The parts come to the machine milled on top and bottom with two reamed locating holes in the crankcase joint face. The cam and crankbores are rough bored. The operation is as follows:

(1) Load part in front of machine; (2) Transfer hydraulically to first working station; (3) Semi-finish bore cam crankbores; (4) Transfer into second work station; (5) Finish bore cam and crankbores; (6) Transfer into third work station; (7) Ream cam and crankbores; (8) Transfer into unloading station.

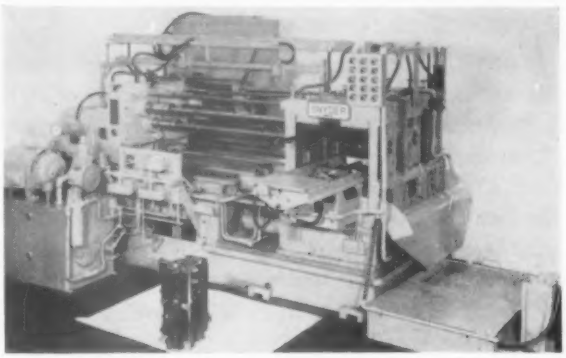


Fig. 1. Five-station transfer-type boring machine used by Peugeot for mirror-finishing cylinder blocks.

In the first two working stations, Davis boring bars with tool blocks are used. The bars are piloted front and rear in rotating bushings. The rear bushings are slotted, permitting the tool blocks to pass through. These bushings are driven from the spindle heads through splined driveshafts. Spindle ends are provided with floating tool holders designed to permit parallel float.

The unusual procedure here becomes apparent by reason of the fact that after the part is finish bored, it is reamed with tungsten carbide inserted-blade reamers. The Peugeot people call this operation mirror finishing, and it is accomplished by flooding the part with large quantities of kerosene. The reaming operation produces an almost unbelievably bright and beautiful finish in both bores. Much attention is given to this operation, especially on the cam bore, since the cam shaft runs directly in cast iron, which it is claimed, provides a very effective bearing for the cam shaft in a high speed engine. There is a very ingenious grinding set-up for these reamers which produces about 2000 pieces per grind with American carbide. The best results obtained with their own is about 500 pieces per grind. The feeds and speeds of these reamers have been ascertained by experiment and must be closely adhered to in order to produce the kind of finish required.

Metal Stitching Speeds Assembly, Reduces Cost

By Arthur G. Denne

MANAGER, ROUND STITCHING WIRE DEPARTMENT
ACME STEEL COMPANY

Part II

THE STITCH-FORMING mechanism of a flat-clinching metal stitcher is shown in Fig. 6. The wire is fed from a coil, not shown, through two feed rolls, *A*, around a curved guide, *B*, through a straightener, *C*, through a round shearing die, *D*, and under the formers, *E*, where it is stopped by an adjustable wire stop, *F*. A shearing knife, *G*, attached to a knife holder, *H*, is actuated by the knife cam, *I*, to cut the wire as it is held in the round shearing die.

The wire, now cut to proper stitch length, is carried under the formers by the mandrel, *J*. As the formers are forced downward, they bend the wire over the mandrel and thus form the stitch. After stitch formation, the mandrel is returned to its original position to receive the next stitch. The formed stitch, now held in position in the guide ways of the formers, is brought down to the work through which it will be driven.

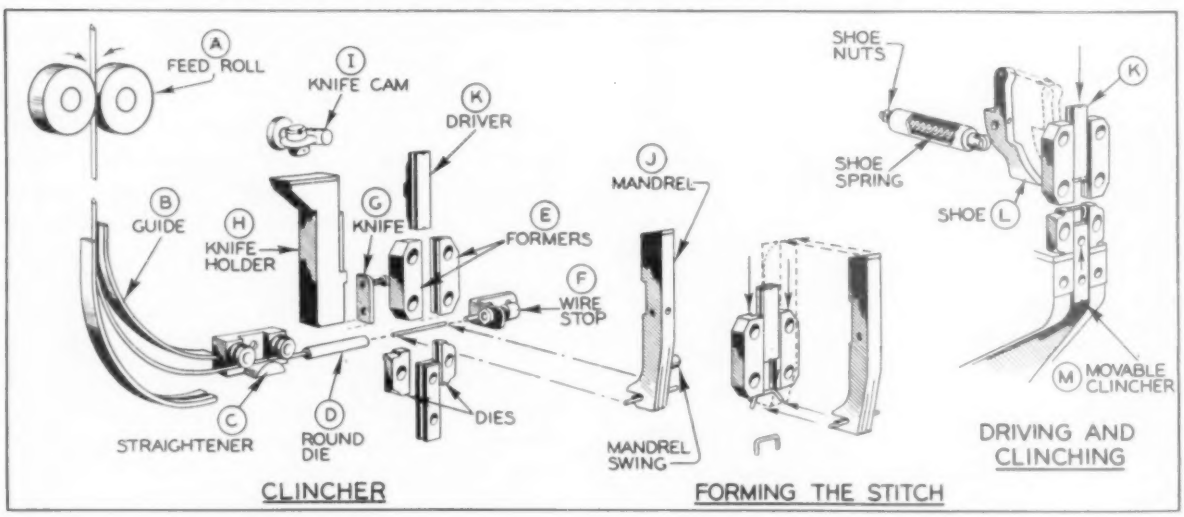
The formers clamp tightly on top of the workpiece and hold it in place during the entire stitching operation. The driver, *K*, forces the stitch through the layers of material. During the driving operation, shoe *L* supports the three inner surfaces of the formed stitch. The former supports the outside of the stitch legs and the driver supports the top of the stitch crown. Thus, all surfaces of the stitch are supported during the entire penetration operation.

A spring-actuated roller follows the cam contour on the back of the shoe, allowing it to be withdrawn at a rate that offers no interference to the driver, but that offers full support to the crown and legs of the stitch until the legs pass through the workpiece thickness. The stitch is then completely driven through by the driver to seat the crown flat against the top material.

Next, while the crown is still held down tightly by the driver, a movable clincher from below, *M*, having a slightly curved groove contour on its nearly flat top face, is forced upward against the slightly bowed-in legs of the stitch. This action forces the legs flat against the bottom layer of the workpiece, thus completing the formation of a flat-clinched stitch. Loop-clinched stitches are formed in the same manner, with the exception that the legs are turned up into one of the loop contours by a solid-die clincher rather then by an actuated clincher.

There are three types of loop clinches: The stand-

Fig. 6. Stitch-forming mechanism of a flat-clinching metal stitcher.



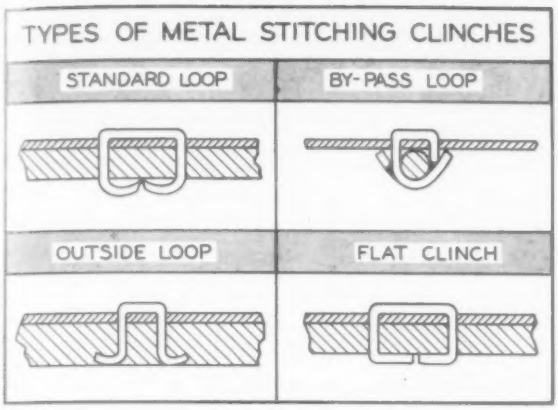


Fig. 7. A comparison of three loop-clinched stitches and a flat-clinched stitch.

ard loop clinch, the by-pass loop clinch, and the outward loop clinch. A graphical comparison of the three loop-clinched stitches and a flat-clinched stitch are shown in Fig. 7.

The by-pass loop is used for assembling all types of metal and non-metal combinations and is especially effective in attaching rods, small tubes, and springs to metal sections. The outside loop is used when it is desired to bury the stitching ends in non-metallic materials.

Flat-clinched stitches provide the highest ultimate strength. However, the flat clinch is unsuitable for the heavier gages of steel or for over ¼ in. of non-metallic materials. This is because in the thicker materials, the legs of the stitch wander as they are driven through and tend to miss the close-tolerance guide-ways in the lower actuated clincher.

Standard and special loop clinches are formed on five types of clincher profiles. The tear-drop profile is used in non-metals-to-metal combinations for clinching on the metal side. The two-groove profile with one end closed is for joining both metals and non-metals to thin metal sections and clinching on a metal side. Both the two-groove open profile and the four-groove open profile are used in metal to non-metal combinations when it is desired to imbed the standard loop clinch in the non-metallic material.

The by-pass profile is used primarily to form ¼-in. crown by-pass stitches around bar and tubing of up to ¼-in. diameter. However, this type can also be used to clinch on flat metal. The outward clinch profile is used to imbed ¼-in. crown outward-clinch stitches in non-metallic materials. The extra row of grooves makes it possible to properly clinch the legs of the stitches even if they wander, as in grainy materials.

These profiles are each available on a number of different clincher blocks. Specific uses and the need to be adaptable to several styles of clincher arms, or holders, has resulted in the creation of four standard types of clincher blocks.

Strength of Metal-Stitched Joints

In addition to the fact that stitches can be loop or flat clinched, they can be applied to the work-pieces either perpendicular, parallel, or diagonal to the line of pull. See Fig. 8. Perpendicular and diagonal stitches have higher shear strengths than do parallel stitches. This is proved by ultimate shear load tests on the three types of flat-clinched stitches in 0.032-, 0.040-and 0.051-in. thicknesses of 24 ST aluminum sheets. Stitch material is 0.051-in. diameter grade 290 wire.

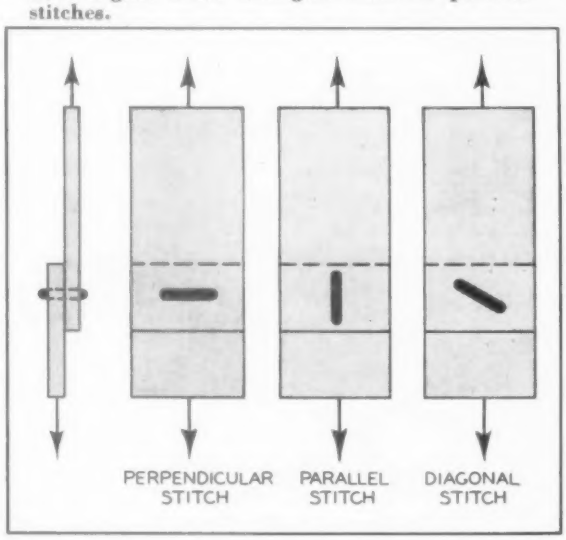
Perpendicular stitches through the 0.032-, 0.040- and 0.051-in. sheets have ultimate shear strengths of 431, 557 and 601 lb per stitch. Parallel stitches through the same thicknesses have ultimate strengths of 443, 476 and 480 lb. Diagonally-positioned stitches have the same values as the perpendicular, but are preferable since they give coverage in both directions.

Stitches in tension, as shown in Fig. 8, have much lower strengths—196, 232, and 252 lbs—for the same metal thicknesses. Butt joining is not recommended. Loop clinches average about 75 percent of the strength of flat clinches. Whenever the yield strength of the non-metallic material being stitched is less than that of the stitching wire, the strength of the loop clinch is more than adequate.

The formation of flat-clinched stitches is actually a punch and die operation, in which the wire punches out small slugs of the same diameter as it is forced through the material being joined. An air blast blows the slugs out of the clincher. The full support of the stitch and the speed with which it is driven permits penetration through thicknesses up to four times the wire diameter. Although a complete stitching cycle is completed in 1/5 of a second, the actual penetration and clinching is accomplished in 1/30 of a second.

Because penetration is limited mainly by the

Fig. 8. Perpendicular and diagonal stitches have higher shear strengths than do parallel stitches.



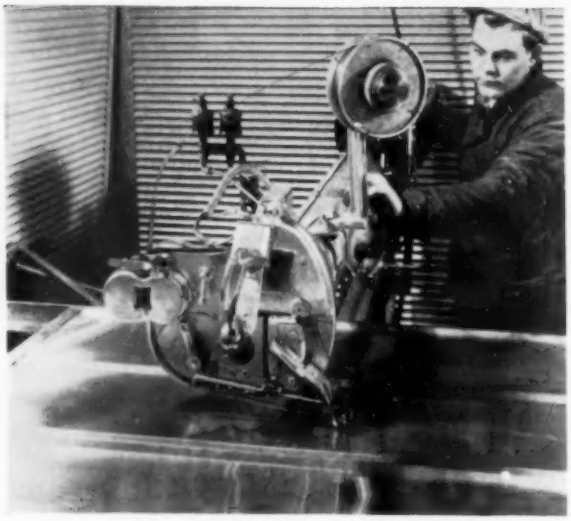


Fig. 9. A special set-up is used to stitch 8×8 ft aluminum sheets to structural members in fabricating door assemblies.

shear resistance of the work, it is usually easier to punch through a number of thin sheets than one heavy sheet of the same total thicknesses. The reason for this is that the wire punches clean round slugs from each sheet shortly before experiencing the full strain of punching the next sheet.

The most frequently stitched metals are: heat-treated, clad and extruded aluminum; cold-rolled steel; galvanized sheets; full-hard, ½-hard, ¼-hard and annealed stainless steel; soft sheet brass and sheet copper.

The most frequently stitched non-metallic materials are: sheet cork, leather, sheet asbestos, fiberboard, standard and tempered Masonite, sponge and solid rubber, the phenolics, the plastics, solid wood and plywood. Table I gives the recommended maximum stitchable thicknesses for these materials.

Not only does metal stitching produce savings in time and material, but it is often a superior method for joining materials not easily assembled by other methods. At the Tomfohr Overhead Door Co. of Portland, Ore., first welding and then riveting was tried in assembling corrugated and flat aluminum sheets into doors. Neither method produced high strength assemblies, and the number of rejects was large. In this instance, metal stitching has increased production more than 30 percent, lowered fastener costs about 75 percent, and reduced the labor cost more than 65 percent.

Two men were required for drilling and riveting operations. Working together, they assembled one door every 55 min, or nine doors per 8-hr shift. With metal stitching, one man is now able to complete a door every 45 min, or 12 doors per 8-hr shift.

In this application, stitches of 18-gage stainless steel wire having 1¼ in. crowns join the sheet aluminum faces of these doors to aluminum structural supporting members. A special setup, consisting of a power-operated table, movable in four directions, and an Acme-Morrison metal stitcher with an extended throat was designed and installed to adapt the production of this 8x8-ft all-aluminum door to metal stitching. See Fig. 9.

Cost per door with metal stitching is $0.087 for the 125 stitches and $0.95 for labor, a total of $1.037. Cost per door with drilling and riveting is $0.33 for the required number of rivets and $3.00 for labor, a total of $3.33. Thus, metal stitching saves this manufacturer $2.29 per door assembly and produces more units per day with less rejects.

Table I—Recommended Maximum Thicknesses for Assembly by Metal Stitching[1]

METALS	Loop-Clinched Metal Stitches: METAL-TO-METAL Any Combination of These		Loop-Clinched Metal Stitches: METAL-TO-NON-METAL Any Combination of These		Flat-Clinched Metal Stitches: METAL-TO-METAL Any Combination of These		Flat-Clinched Metal Stitches: METAL-TO-NON-METAL Any Combination of These		NON-METALS
Aluminum (Soft) 3So, 52So, 61So 24So-clad, R301-0 R301-W, 75So, 75SW	0.093 in.	0.093 in.	0.125 in.	½ in.	0.093 in.	0.093 in.	0.125	⅛	Sheet Cork
Aluminum (½ Hard) 3S-½ Hard, 52S-½ Hard	0.064	0.064	0.080	⅜	0.064	0.064	0.080	3/16	Leather
Aluminum (Hard) 61ST, 24ST-clad, 24SRT-clad, R301-T, 75ST	0.040	0.040	0.064	¼	0.040	0.040	0.064	3/16	Sheet Asbestos
Aluminum Extrusion	0.062	0.062	0.093	½	0.062	0.062	0.093	¼	Fibreboard
1010 Cold-Rolled Steel	0.0475 (18 ga.)	[a]0.0475 (18 ga.)	0.0800 (14 ga.)	½	0.0348 (20 ga.)	0.0348 (20 ga.)	0.0348 (20 ga.)	⅜	Sponge Rubber
Hot Rolled Steel	0.0475 (18 ga.)	[a]0.0348 (20 ga.)	0.0625 (16 ga.)	¼	0.0348 (20 ga.)	0.0348 (20 ga.)	0.0348 (20 ga.)	¼	Solid Rubber
Galvanized Sheet	0.0348 (20 ga.)	[a]0.0348 (20 ga.)	0.0475 (18 ga.)	⅛	0.0312 (21 ga.)	0.0312 (21 ga.)	0.0312 (21 ga.)	⅛	[b]Phenolics
Stainless—(Type 302) Full Hard	0.010	0.010	0.020	3/16	0.010	[d]	0.010	3/16	[b]Plastics
Stainless, ½ Hard	0.012	0.012	0.025	⅜	0.012	[d]	0.012	3/16	Standard Masonite
Stainless, ¼ Hard	0.015	0.015	0.030	¼	0.015	0.015	0.015	¼	Tempered Masonite
Stainless, Annealed	0.020	0.020	0.040	[c]⅜	0.020	0.020	0.020	3/16	Solid wood
Sheet Brass, Soft	0.030	0.030	0.050	[c]⅜	0.030	0.030	0.040	¼	Plywood
Sheet Copper	0.035	0.035	0.064		0.035	0.035	0.045		

[1]—Compiled by the Stitching Wire Division, Acme Steel Company, Chicago.
[a]—Rockwell 50 on B scale, or softer.
[b]—Must be soft enough to penetrate without cracking.
[c]—Grain structure may cause leg wander in thicknesses over ⅜ in.
[d]—Stitching full-hard or half-hard stainless to itself is not recommended.

A.S.T.M. Specifications for Soft Solder Metal

B 32-49

Chemical Composition (See footnotes a, b, c)

Alloy Grade	Tin, desired, per cent	Lead, nominal, per cent	Antimony, per cent			Silver, per cent		
			Minimum	Desired	Maximum	Minimum	Desired	Maximum
70A	70	30	—	—	0.12	—	—	—
70B	70	30	—	—	0.50	—	—	—
60A	60	40	—	—	0.12	—	—	—
60B	60	40	—	—	0.50	—	—	—
50A	50	50	—	—	0.12	—	—	—
50B	50	50	—	—	0.50	—	—	—
45A	45	55	—	—	0.12	—	—	—
45B	45	55	—	—	0.50	—	—	—
40A	40	60	—	—	0.12	—	—	—
40B	40	60	—	—	0.50	—	—	—
40C	40	58	1.8	2.0	2.4	—	—	—
35A	35	65	—	—	0.25	—	—	—
35B	35	65	—	—	0.50	—	—	—
35C	35	63.2	1.6	1.8	2.0	—	—	—
30A	30	70	—	—	0.25	—	—	—
30B	30	70	—	—	0.50	—	—	—
30C	30	68.4	1.4	1.6	1.8	—	—	—
25A	25	75	—	—	0.25	—	—	—
25B	25	75	—	—	0.50	—	—	—
25C	25	73.7	1.1	1.3	1.5	—	—	—
20B	20	80	—	—	0.50	—	—	—
20C	20	79	0.8	1.0	1.2	—	—	—
15B	15	85	—	—	0.50	—	—	—
10B	10	90	—	—	0.50	—	—	—
5A	5[d]	95	—	—	0.12	—	—	—
5B	5[d]	95	—	—	0.50	—	—	—
2A	2[e]	98	—	—	0.12	—	—	—
2B	2[e]	98	—	—	0.50	—	—	—
2.5S	0[f]	97.5	—	—	0.40	2.3	2.5	2.7
1.5S	1[g]	97.5	—	—	0.40	1.3	1.5	1.7

a For elements other than those mentioned in the table, the maximum content in the alloy shall be as follows:

Bismuth	0.25	per cent
Copper Alloy grades 70A to 2B, incl.	0.08	per cent
" Alloy grades 2.5S and 1.5S	0.3	per cent
Iron	0.02	per cent
Aluminum, Zinc	each shall not exceed 0.005	per cent when determined on a 10-g sample

b Analysis shall regularly be made only for the elements specifically mentioned in the above table. If, however, the presence of other elements is suspected, or indicated in the course of routine analysis, further analysis shall be made to determine that the total of these other elements is not in excess of 0.08 per cent.

c The chemical requirements of SAE Specifications Nos. 1A, 2A, 2B, 3A, 3B, 4A, 4B, 5A, 5B, 6A, and E—07 conform substantially to the requirements for alloy grade Nos. 45B, 40B, 40C, 30B, 30C, 25B, 25C, 20B, 20C, 15B, and 2.5S respectively.

[d] Permissible tin range 4.5 to 5.5 per cent.

[e] Permissible tin range, 1.5 to 2.5 per cent.

[f] Tin maximum, 0.25 per cent.

[g] Permissible tin range, 0.75 to 1.25 per cent.

Permissible Variations in Chemical Composition

(a) Tin Content—The permissible variations in tin content for alloys containing 10 percent or more of tin shall be as follows:

	Permissible Variations	
	At Random Sample (Spot Sample)	Composite Sample
Tin, min., percent		
Fabricated metal	nominal minus 1.50	nominal minus 1.00
Cast metal	nominal	nominal minus 0.50

(b) Antimony Content—The permissible variations in antimony content shall be as specified in Table.

(c) Silver Content—In alloy grades 2.5S and 1.5S the silver shall be as specified in Table.

(d) Lead Content—Lead shall in all cases be taken as remainder.

(e) Impurities—Other elements in solder metal shall not exceed limits stated above.

The Melting Range of Tin-lead Solders

% Tin Content	% Lead Content	Completely Molten °C	Completely Molten °F	Completely Solid °C	Completely Solid °F
0	100	327	621	327	621
1	99	325	616	322	612
2	98	322	611	316	601
3	97	319	605	310	590
4	96	316	601	305	581
5	95	314	596	300	572
6	94	311	591	294	561
7	93	308	586	288	550
8	92	306	582	281	538
9	91	303	577	275	527
10	90	301	573	268	514
11	89	298	568	260	500
12	88	296	564	251	484
13	87	294	560	242	468
14	86	292	557	234	453
15	85	290	553	225	437
16	84	288	550	214	417
17	83	285	545	205	401
18	82	283	541	196	385
19	81	281	537	186	367
19.5	80.5	280	535	183.3	362
20	80	279	533	183.3	362
21	79	276	530	183.3	362
22	78	274	525	183.3	362
23	77	272	522	183.3	362
24	76	270	518	183.3	362
25	75	268	514	183.3	362
26	74	266	512	183.3	362
27	73	264	506	183.3	362
28	72	262	503	183.3	362
29	71	260	499	183.3	362
30	70	258	496	183.3	362
31	69	256	492	183.3	362
32	68	254	488	183.3	362
33	67	252	485	183.3	362
34	66	250	481	183.3	362
35	65	248	478	183.3	362
36	64	246	475	183.3	362
37	63	244	471	183.3	362
38	62	242	468	183.3	362
39	61	240	464	183.3	362
40	60	238	460	183.3	362
41	59	236	456	183.3	362
42	58	233	451	183.3	362
43	57	231	448	183.3	362
44	56	229	444	183.3	362
45	55	227	440	183.3	362
46	54	224	435	183.3	362
47	53	222	431	183.3	362
48	52	219	426	183.3	362
49	51	217	422	183.3	362
50	50	215	418	183.3	362
51	49	212	414	183.3	362
52	48	210	410	183.3	362
53	47	207	405	183.3	362
54	46	205	401	183.3	362
55	45	203	397	183.3	362
56	44	200	392	183.3	362
57	43	198	388	183.3	362
58	42	195	388	183.3	362
59	41	193	379	183.3	362
60	40	190	374	183.3	362
61	39	187	369	183.3	362
61.9	38.1	183.3	362	183.3	362
62	38	183.5	363	183.3	362
63	37	184.5	364	183.3	362
64	36	185	365	183.3	362
65	35	186	367	183.3	362
66	34	187	369	183.3	362
67	33	188	370	183.3	362
68	32	189	372	183.3	362
69	31	190	374	183.3	362
70	30	191	376	183.3	362
71	29	192	378	183.3	362
72	28	193	379	183.3	362
73	27	194	381	183.3	362
74	26	195	383	183.3	362
75	25	196	385	183.3	362
76	24	198	388	183.3	362
77	23	199	389	183.3	362
78	22	200	392	183.3	362
79	21	201	394	183.3	362
80	20	202	396	183.3	362
81	19	204	398	183.3	362
82	18	205	401	183.3	362
83	17	206	403	183.3	362
84	16	208	406	183.3	362
85	15	209	408	183.3	362
86	14	210	410	183.3	362
87	13	212	413	183.3	362
88	12	213	415	183.3	362
89	11	215	418	183.3	362
90	10	216	421	183.3	362
91	9	218	424	183.3	362
92	8	219	426	183.3	362
93	7	221	429	183.3	362
94	6	222	432	183.3	362
95	5	224	434	183.3	362
96	4	225	439	183.3	362
97	3	227	441	183.3	362
98	2	228.5	443	183.3	362
98.4	1.6	229	444	183.3	362
99	1	230	446	212	414
100	0	232	450	232	450

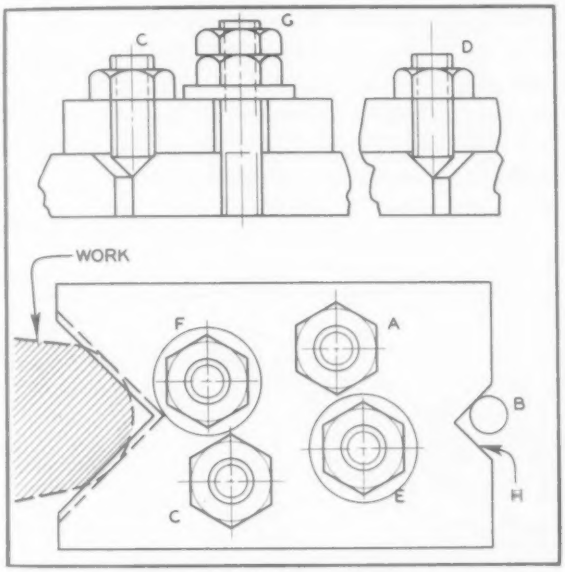
—Courtesy, Federated Metals Division, American Smelting and Refining Company

Gadgets

Ingenious Devices and Ideas to Help the Tool Engineer in His Daily Work

Adjustable Locating "V"

Usually a locating "V" is held by dowels and screws. When the workpiece is a forging, the variations make it difficult to rely on drawing dimensions. Ordinarily the "V" is ground to fit the work. A better method is to drill ample clearance holes for the studs and only reamer drill the others, and with tap holes in the base plate. After adjusting the "V" to the workpiece, dowel holes can be copied in the jig plate and reamed together.



An adjustable locating "V" facilitates handling a variable workpiece.

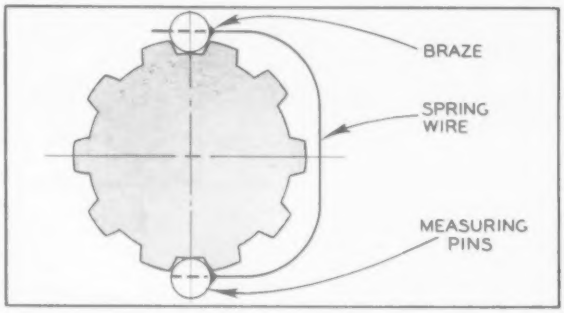
The "V" plate shown in the sketch has two tapped holes containing standard 90-deg cone point setscrews and check nuts, two ample clearance holes for the studs (G) and a 90-deg notch (H). The jig plate contains the two studs (G) and two 90-deg countersink holes in offset position with regard to the setscrews, as well as a dowel pin touching the side of the notch. For assembly, push the block against pin B and the round of the work; tighten nuts E and F and the check nuts. Finally, bear down with setscrew against the side of the countersinks at C and D.

R. Mery
Farmingdale, N. Y.

The Tool Engineer pays regular page rates for accepted contributions to these pages, with a minimum of $5.00 for each item.

Measuring Over Pins

When measuring splines, gear teeth, etc., over pins, the method shown here saves time and facilitates handling. It is especially useful when checking a large number of pieces.

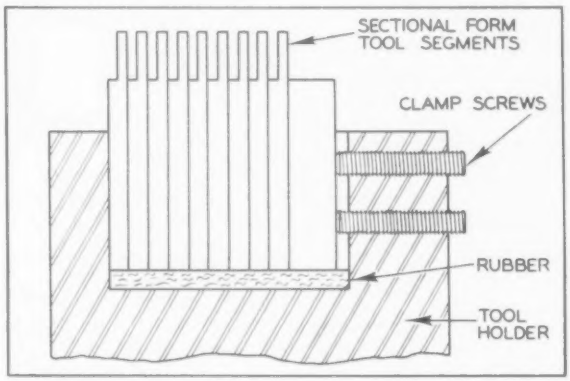


Small holes are drilled in the measuring pins and a length of spring wire is inserted and brazed in place. The tension of the wire will hold the pins securely in the tooth spaces, leaving the hands free for using the micrometer.

Irving Mansfield
New York, N. Y.

Sectional Form Tool Adjustment

The proper setting and adjusting of inserted blade or sectional form tools in tool holders is very often a difficult and laborious procedure, especially if the sections are narrow and the setting must be very close.

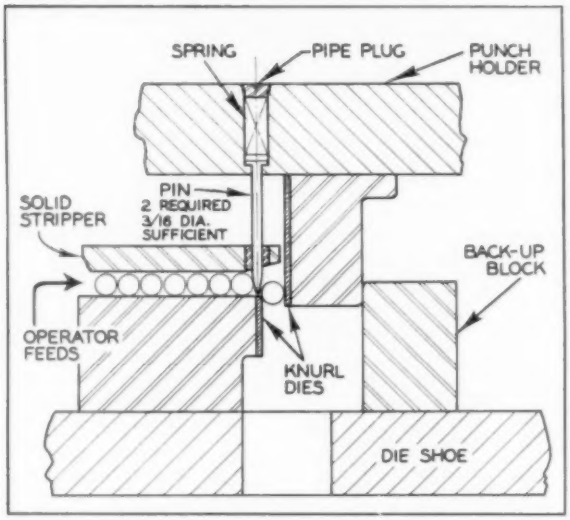


I have found that by inserting a piece of rubber, or even a rubber band, as shown in the sketch, in the holder of the tool between the tool holder and the tool, adjustment is greatly facilitated.

O. C. Steffens
St. Louis, Mo.

Knurling on a Punch Press

Shown in the accompanying sketch is a method of knurling on a punch press. For best results, the press should be inclinable.



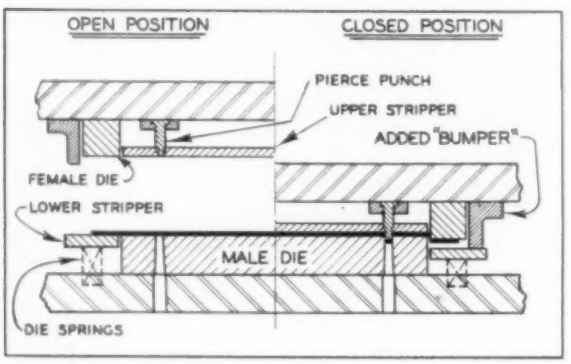
In the illustration, the ram is on the way down. As it descends, the piece is rolled between the knurl dies and finally drops through the die shoe. Two spring-loaded pins with long bullet noses, located about ¼ in. from the ends of the piece, are lifted out of the stripper but not out of the bushing as the ram rises. The next piece is then permitted to roll into position. Either straight or diamond knurls can be made in this manner.

L. W. Montgomery
Chicago, Ill.

Scrap Removal from Compound Dies

In a compound die where stripper plates are required for both upper and lower dies, difficulty may be encountered in separating the scrap from the blanked part after each press operation. No doubt this is caused by the lower stripper plate forcing the scrap material back up into the trimmed piece under spring pressure, and the trimmed piece itself is in turn held down on the lower die by the upper stripper plate.

The added bumper on this die prevents the scrap from being forced into the blanked piece.

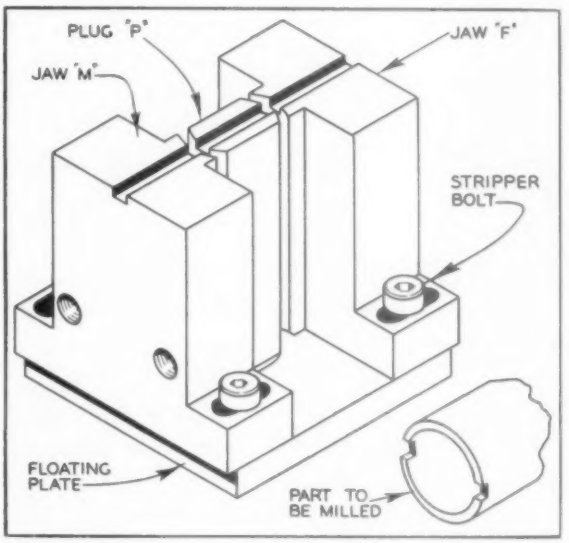


To overcome this condition, bumper blocks may be fastened to the upper die shoe at conveniently located points with the bumper end extending below the cutting edge for at least material thickness. These bumper blocks will then contact the lower stripper plate slightly ahead of the cutting action. Conversely, when the die has completed its cutting action and the press starts its upward cycle, the lower stripper plate will not return to the die level until after the upper stripper plate has left the trimmed piece. Thus, it is impossible for the scrap to be forced into the blanked piece.

L. Z. Micai
Trenton, N. J.

Slot Milling Fixture

A milling fixture for milling a slot in the end of a short piece of non-metallic tubing is shown here. To avoid objectional burrs raised by the cutter, the work must be backed up on the cut edges, and since the ID and the OD vary plus or minus 0.010 in., this becomes difficult with the ordinary type of plug and jaw fixture.



Operation of the fixture shown here is both simple and fast. With the fixture mounted in either an air or hand vise, the part is slipped over the plug and the vise closed. Any variation in size is compensated for by distorting the tube slightly. The tube returns to shape immediately upon being released.

The center plug is made 0.003 in. smaller than the low limit on the tube and relieved on the sides for easy loading and unloading.

J. W. Newcomer
Kennett Square, Pa.

Army Ordnance:

The Boom-or-Bust Business

By Gilbert P. Muir

THE OFFICE, CHIEF of Ordnance of the U.S. Army is one of the world's biggest businesses, currently operating at a thirty-five billion dollar rate, with a product list of over 400,000 items.

Ordnance has one function—to produce. It neither originates requirements nor sets the quantity—these are functions of the Field Forces. Since it was established in 1812 to "direct the inspection and proving of all pieces of ordnance, cannon balls, shells and shot . . . (and) of all carriages . . . ammunition waggons, pontoons and traveling forges", Ordnance has had the job of maintaining a nucleus in a non-military country which, in time of emergency, could furnish almost overnight the armament for war.

This original mission has changed somewhat since 1812, but Ordnance still has the responsibility of "inspection and proving the public powder", along with tanks and other automotive equipment, rockets and fire control, which includes all the optical and electronic equipment needed to locate the target as well as fire at it.

Within the Ordnance organization, this primary function of producing arms is centered in the Industrial Division, headed by Brigadier General Emerson Leroy Cummings. A West Pointer (Class of 1924), General Cummings has over nineteen years in Ordnance, was formerly industrial operations chief at Detroit's Tank Automotive Center.

Brig. Gen. Emerson L. Cummings who heads the Industrial Division, Ordnance Corps.

Development, pilot line work and full production in Ordnance can be roughly broken down into development and tool engineering phases with much the same distinctions practiced in industry. Paralleling the Industrial Division on the Ordnance Corps organization chart is the Research and Development Division which coordinates research, experimentation and pilot plant operation on new weapons and equipment. Tool engineering and production are handled by the Industrial Division, with close coordination between the two divisions during the transition from development to full production.

From an organizational standpoint, the Industrial Division is an entity within a going business. It is organized on a commodity basis, with four branches (ammunition, artillery, small arms and automotive) running, on an operational level, the tooling and production programs connected with their respective branches. On the same level as the commodity branches, and serving as sort of a combined board of review and coordinating agency, is the Production Service Branch—tool engineering and production control on a policy level.

Manufacturing Policy

The stated policy of the Ordnance Corps—and one that they consciously work at—is decentralization of authority and operations. Toward this end, Ordnance has since the forties reworked its formerly separate district and arsenal pictures into an overall plan that, while successful, is still getting considerable attention.

Basically, the United States is divided for Ordnance procurement purposes into fourteen geographical districts, each centered in an industrial area. This is a historic pattern, and has been used effectively during two wars to mobilize industry for defense production, as well as to provide a local contractual office to deal with industry on defense contracts.

Further development during World War II of the 'center' program has resulted in considerably better administration of procurement programs in the field. Three centers are now in operation, with a fourth, for artillery, planned in the future. Presently, the Tank Automotive Center at Detroit operates the tank and automotive program; the small arms ammunition center at St. Louis handles small arms ammunition; and the ammunition center at Joliet, Ill., controls ammunition other than small arms.

Three Levels of Control

Thus organizationwise there are three levels of control, with the existing districts to handle contractual details. The Production Service Branch coordinates and controls all programs in the Industrial Division on behalf of the Chief of Ordnance. The Automotive Branch, as an example, is the operating authority for its program. The Tank Automotive Center is the manufacturing entity, receives the requirements, breaks them down, and plans for production within its own facilities as well as for outside parts requirements. The District comes in at this level. When contracting requirements are set, the Ordnance Districts, in their respective localities, negotiate with acceptable contractors and contract for the work on behalf of Ordnance.

(Left, from top to bottom) Heavy tank, 1928. A new tank, the M-46, now in use in Korea. Duck (#8), armed with a 105-mm howitzer, 1949. The "Otter", one of the newest amphibious troop carriers. Armored personnel carrier.

Ordnance believes that the Center-District team offers many advantages in efficiency of procurement. First, placing manufacturing responsibility with a mission arsenal or a center rather than with several arsenals jointly has an obvious advantage in eliminating duplication. The center can utilize facilities and assistance from the Ordnance organization, and has a specialized job.

Further, encouraging complete handling of contractual arrangements through the District enables Ordnance, first of all, to use the specific knowledge of the local area which the Districa organization has. It enables the Tank Center, for example, to draw on perhaps a half-dozen or more districts for subcontracting sources, and to keep all negotiations with contractors at the district level.

The Tank Automotive Center at Detroit is perhaps the most advanced of the centers, in that it has gone further in absorbing nearly complete manufacturing responsibility. Eventually, according to plans, all designs will be created and contracts originated through the centers.

Materials Allocation

CMP administration in Ordnance follows the general direction from the Chief of Ordnance through the centers to the districts. The Office, Chief of Ordnance might have, for example, an allotment of 60,000,000 pounds of aluminum for the fourth quarter of this year. Through the Production Service Branch, requirements for all Ordnance commodity branches are computed, with the Ammunition Branch getting perhaps 30,000,000 pounds. Control shifts to the Ammunition Center, where the allotment is broken down into individual shares on the basis of CMP priority requests which manufacturers working on ammunition con-

tracts have forwarded to their districts, who in turn have referred the requests to the center.

In effect, the district is a vital cog in the Ordnance machine. Each district has the responsibility for Industrial Mobilization Planning in its area—the detailing of what companies were used during World War II, what they made, and what the area is capable of producing during the next emergency. Some 80 percent of Ordnance inspectors are controlled by the districts, and their releasing orders for shipment is a major advantage to the center, as well as to the contractor, who is looking for payment.

Production Service

Production Service is the administrative and coordinating branch of Ordnance's Industrial Division. Its functions—expediting, controlling production, administration of CMP, to name a few—make it the nerve center behind the four commodity branches and their programs.

In production control and scheduling, Production Service performs the top tool engineering functions. The desired characteristics of a new piece of equipment—speed, weight, firepower, etc.—come from Army field forces. Through the appropriate branch in Research and Development the design is created, brought before the Ordnance Association Technical Committee with representation from the Navy and Air Force. The design and production problems are, so far as possible, then resolved. Conference at this stage results in change in classification of the item from a 'T' designation to an 'M' designation and the 'M' item is then charged to Production Service.

After production engineering, the item—a tank, for example—becomes an assignment of one or more commodity branches, under the direction of Production Service. The Tank Automotive Center will get the assignment of producing the tank hull and automotive assembly. Gun requirements go to a gun arsenal, and fire control needs to another. Here is the overall control phase of Production Service. In addition, follow-up must be maintained—expediting on a large scale. Initial follow-up is centered on the established production schedules of the various centers and arsenals to ensure that overall requirements are being met. Individual follow-up is necessary to make sure that guns and fire control, or engines, are available for tanks when hulls are completed as per schedule.

CMP control and materials expediting similarly fit into this operation. We have shown earlier how CMP allotments for the entire Ordnance picture are handled by the Office, Chief of Ordnance. Actual administration for the commodity branches and, in turn, their manufacturing operations is an important responsibility of the Production Service Branch. Aid to arsenals and contractors in obtaining necessary machine tools is an allied activity. Production Service works to obtain the required tools from existing Army-Navy-Air Force reserves, from among those tools which are in standby at plants of the commodity branches, or through established pool order allotments from NPA. Requests for aid in procuring machine tools proceed from the manufacturer through his Ordnance District to Production Service.

Budgetary activity in Production Service is similar in operation to CMP and tools requirements. This branch is responsible for coordination of budget estimates for all Ordnance procurement. Estimates proceed from the mission arsenals and the centers through the commodity branches to Production Service.

Production Service's planning for manufacture is along two lines: current and long-range. In the former category are military requirements

(Right, from top to bottom) A French 75-mm gun. Rocket launcher, developed during World War II. A 57-mm recoilless rifle, shown here in use on the Korean battlefront. The WAC Corporal, an Army rocket, in the preliminary stages of preparation for launching.

involving at least the next fiscal year; in the latter are facilities, production processes and research which run timewise from a few years to the indefinite future.

A great deal of current production planning must be, of necessity, starting from near scratch and going immediately into high gear according to long-range operational plans which have been established previously. For example, Production Service receives from the Army General Staff notice that during the next year requirements will include say 2,105 howitzers and 200,000 rifles. First consideration is a production rate that will provide, considering stocks on hand, a volume sufficient to meet actual needs.

Assuming the field forces are engaged in action against the enemy, these needs must be modified in terms of the number of rifles required to be in service, the length of the supply pipeline (and therefore time needed to get a rifle to the front), maintenance and spare parts requirements, and combat loss. This scheduling is a part of the Production Service job.

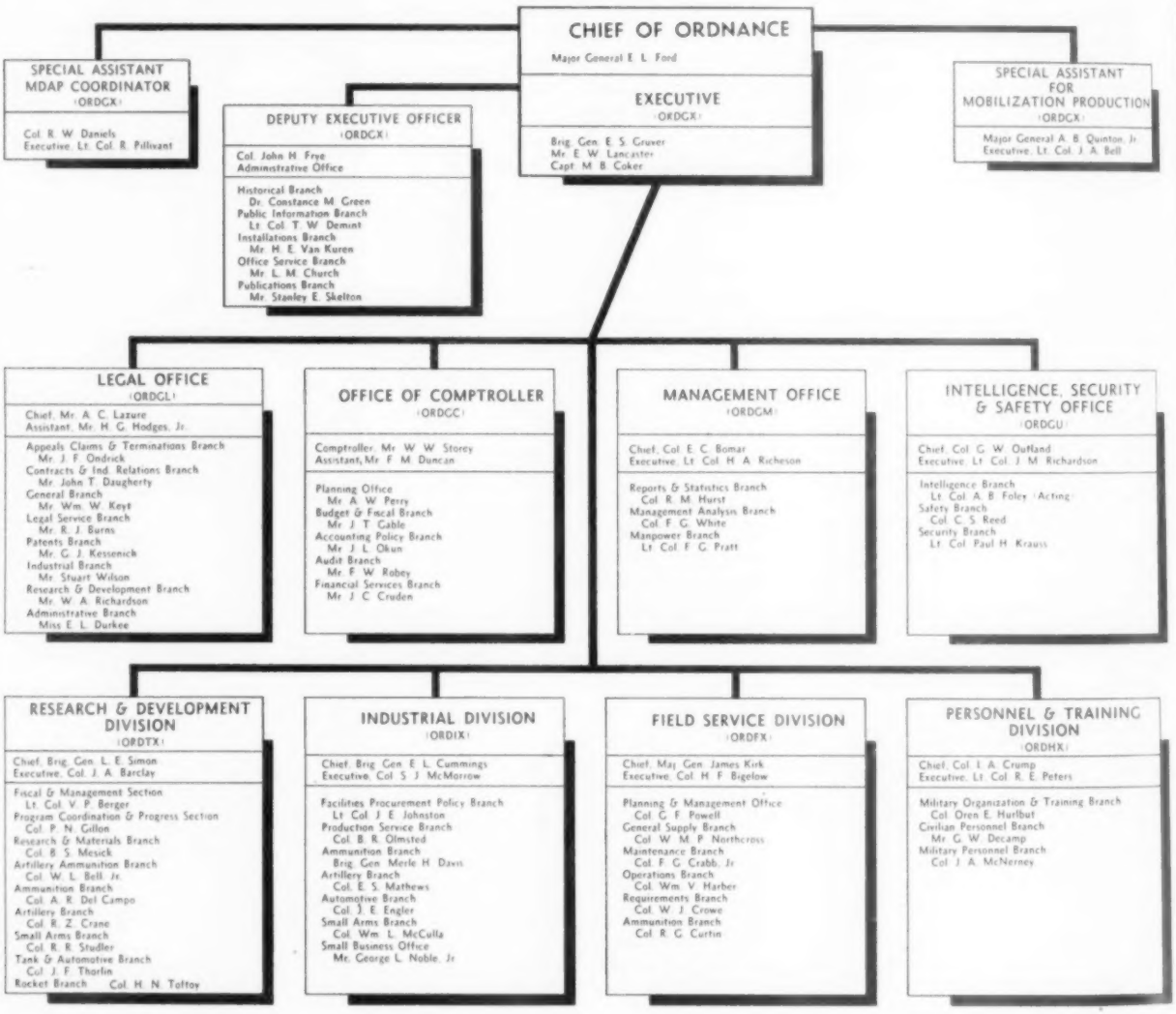
Mobilization Planning

Long-term planning looks forward to improvements in manufacturing techniques as well as to future emergencies—Mobilization Planning.

One facet of this work familiar to industry is the so-called Phase Study, a program which can be applied to process investigation or mobilization study. The plan is divided into three phases, the first of which permits Ordnance to grant up to $12,000 to a private manufacturer for study. Such a project might involve development of a plan for conversion or preparation of the manufacturer's plant in event of war. The report would include recommendations on how other producers in similar fields could undertake conversion and thus, in effect, could be an industry blueprint.

A Phase Two study under Ord-

Chart showing organization of the Office, Chief of Ordnance.



nance direction might be an investigation of process or production recommendations made by the manufacturer above, or perhaps by an arsenal studying future production bottlenecks. This type of program can run from a set of drawings to a complete pilot line.

Phase Three programs involve an actual pilot plant operation, with enough production to meet the educational requirements of the industry.

As pointed out above, these programs can be used for process investigations or plans for mobilization. Production Service augments its blueprints for industrial mobilization with other activities, one of which is the index maintained by each Ordnance District—and duplicated at the Pentagon—of all productive capacity in the district and its potentialities in case of war. Maintenance of standby plants and arsenals is another. Acquisition-preservation, maintenance of machines, tools and gages is still another measure.

Production Service—Engineering

Establishment by the Production Service Branch of Ordnance of policies and standards governing production quality, engineering standards, inspection, gages and education of Ordnance inspectors comprises a considerable part of its coordination work.

Such functions originate in the Engineering Section of Production Service, and involve cooperation by the section with, for example, Ordnance's commodity branches, Navy and Air Force groups, industrial organizations such as the Ordnance Association, engineering societies and national and international standards organizations.

Standardization

Ordnance engineering standards govern the design and use of the nuts, bolts, screws, machine products and various fasteners used in Ordnance. A program of standardizing on designs and sizes over the past thirteen to fourteen years has resulted in the elimination of up to 60 percent of the number of sizes stocked of certain parts. In actual numbers this means a reduction of from 125,000 to 65,000 varieties. About 45-50 varieties of common hardware also fall into this group—hasps, hinges, back-up plates, etc.

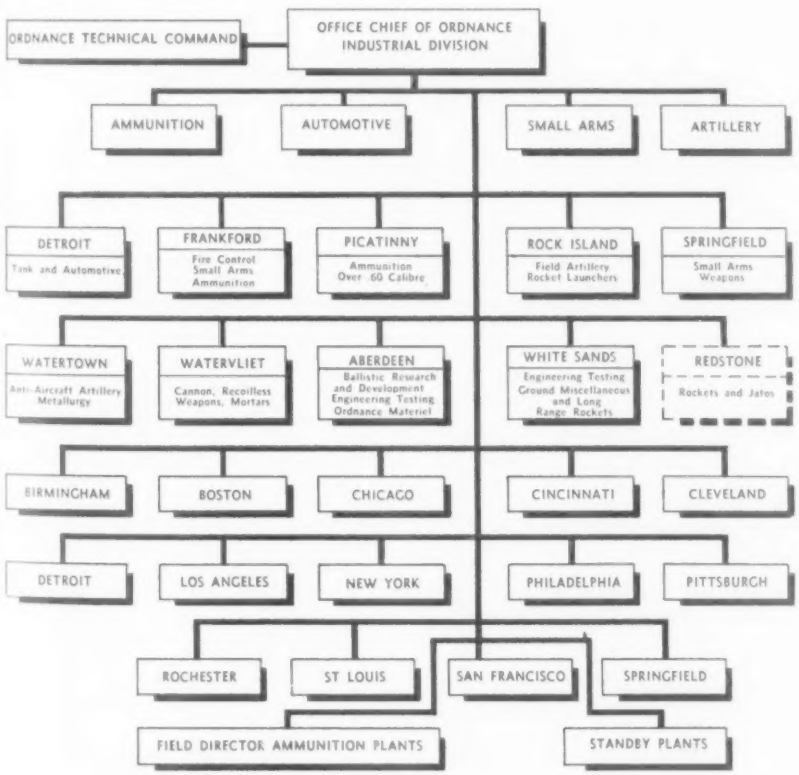
Standards of this order are generally recommended by the commodity branches, are studied and approved by Production Service.

Two overall publications list these standard products: The Ordnance Engineering Standards Volume, and the Master Book of Ordnance Engineering Standards. As parts in the Engineering Standards Volume become obsolescent, they are transferred to the Master Book for permanent file, so that at any time drawings of all parts which have at one time been a standard design are available for replacement requirements.

Production Service-Engineering has the responsibility for developing drafting procedures for the Ordnance branches, and correlating procedures and drafting standards in concurrence with Military Standard Practices. The section has, for the past six years, been working with agencies of the Navy and Air Force on these unified standards, and to date about twenty-five have been released and published. Some of these are shown in the table of available unified standards on page 64.

Quality Control and Inspection

Quality of production is controlled in Ordnance by general policies established by Production Service, and by specific manuals of inspection developed by the commodity branches and approved by Production Service. Statistical quality control is governed by Military Standard 105A—Sampling Procedures and Tables for Inspection by Attributes—which is a unified standard.



This line chart illustrates the divisions and their responsibilities in the Industrial Division of the Ordnance Corps.

Inspection operations are carried out by the procurement offices under the staff supervision of the various commodity branches. It is the responsibility of Production Service to coordinate educational programs to train these inspectors, and at the current rate the branch is planning for some 13,000 new inspectors over the next few years. These courses, as developed by the commodity branches at the arsenal level, generally involve four stages. Basic and advanced courses on general inspection considerations are standard for all inspectors; specialized courses on both basic and advanced levels, which a resident inspector would complete, are also provided. For example, over 500 inspectors are currently being trained in a recently-developed advanced course in inspection of electronic equipment.

The Production Service Branch is composed of the five sections shown here with their functions.

Gage Design and Inspection

Following the pattern we have seen thus far, gage design in Ordnance is separated into general and special application levels. Utilization of all standard gages is under the direction of the Production Service Branch, while the commodity branches are responsible for developing special gages required in their own work—special ammunition gages, for example.

How many gages of what type are required in inspection? Based on the need for controlling certain factors in the item, this is a joint function of the designer and the inspection group, following policies established in the General Inspection Manual, and done under the direc-

(Continued on page 64)

The Ammunition Branch of the Industrial Division has six sections. The organization chart at the right details the duties and responsibilities allocated to this branch.

PRODUCTION SERVICE BRANCH
INDUSTRIAL DIVISION

1. Responsible for Ordnance-wide supervision, administration and coordination of policies and procedures concerning:
   - A. Procurement methods, procurement responsibility assignments.
   - B. Procurement and production planning, current and long range.
   - C. Procurement and production progress.
   - D. Materials requirements and allocations including the Controlled Materials Plan.
   - E. Machine tools and production processing equipment.
   - F. Industrial priorities.
   - G. Expediting.
   - H. Ordnance drawing procedures and engineering standards; military drawing, engineering and equipment standards under MBSA; American-British-Canadian Standards.
   - I. Item identification and cataloging under Munition Board Cataloging Agency.
   - J. Material identification, nomenclature, model designation and numbering.
   - K. Standardization, design, procurement, inspection, modification, storage and issue of Ordnance final inspection gages, gage and gage laboratory equipment and standard measuring equipment, including procurement of certain field service gages.
   - L. Quality control, inspection handbooks, inspector training courses, gaging, proofing, and proof materials.
   - M. Screw thread program.
   - N. Microfilming of drawings at Ordnance installations.
2. Responsible for Division-wide supervision, administration and coordination of policies and procedures concerning:
   - A. Procurement pricing.
   - B. Budget estimates.
   - C. Fund programming and administration.
   - D. Control of items, commodities and supplies, used in production at Division installations, for which other technical services have procurement and issue responsibility.
   - E. Mobilization planning.
   - F. Manpower.
   - G. Organized Reserve Corps matters pertaining to mobilization assignments of personnel to Industrial Division and to units in which the Industrial Division has primary interest.
3. Responsible for administrative supervision of district offices.
4. Maintains Ordnance Procurement Information Center.
5. Responsible for administrative supervision and technical direction of procurement and inspection policies and procedures for liquid fuels, cleaning and preserving materials, lubricants and associated materials at Raritan Arsenal.

DISTRICT CONTROL AND ADMINISTRATION SECTION

1. With respect to District Offices, is responsible for:
   - A. Initiating policies and procedures for District operation and administration.
   - B. Administrative supervision, coordination, liaison and contact.
   - C. Making studies and investigations of District organizations, work loads, costs of operation, personnel requirements, etc., for budgetary purposes and special reports, as required.
2. Maintains liaison with Staff Branches of OCO on matters pertaining to military and civilian personnel strength authorizations for District Offices and other Industrial Division Installations.
3. Receives Inspector General and other inspection reports on District Offices, studies criticisms and recommendations contained therein, clears with agencies concerned, initiates corrective action where required and endorsement of action taken to the Inspector General.
4. Responsible for Branch administrative matters, including implementation of administrative policies and directives, military and civilian personnel administrative matters, records and reports control administration, property records, security, and general administrative services.

IDENTIFICATION AND CATALOGING SECTION

1. Responsible for Ordnance-wide supervision, administration and coordination of policies and procedures concerning:
   - A. Munitions Board Cataloging Program including budget estimates and funding therefor.
   - B. Material identification, nomenclature, model designation and numbering.
   - C. Part and Federal stock numbering.
   - D. Microfilming of drawings at Ordnance installations.
2. Reviews and coordinates those phases of the MBCA program performed by other Government agencies which affect the Ordnance Corps.
3. Responsible for screening all requests for engineering drawings received from other Government agencies and commercial concerns.
4. Responsible for assignment of identifying numbers for adopted items and blocks of drawing numbers for Ordnance parts.

CENTRAL PLANNING SECTION

1. Responsible for Ordnance-wide supervision, administration, and coordination of policies and procedures concerning:
   - A. Procurement and production planning, current and long range.
   - B. Procurement and production progress.
   - C. Machine tools and production processing equipment.
   - D. Materials requirements and allocation.
   - E. Supply of solid fuels, petroleum, oil and lubricants for Ordnance establishments.
   - F. Processing of alcohol tax exemption permits.
2. Responsible for division-wide supervision, administration, and coordination of policies and procedures concerning:
   - A. Budget estimates.
   - B. Fund programming and administration.
   - C. Control of items, commodities and supplies used in production at division installations, for which other technical services have procurement and issue responsibility.
   - D. Mobilization planning including production capacity allocations, industry preparedness measures.
   - E. Manpower.
3. Assembles, reviews and processes production orders for presentation to and approval of Work Authorization Committee.
4. Edits the Procurement Bulletin.

ENGINEERING SECTION

1. Responsible for Ordnance-wide supervision, administration, and coordination of policies and procedures concerning:
   - A. Ordnance engineering standards.
   - B. Ordnance drawing procedures including drafting room regulations.
   - C. Military drawing, engineering and equipment standards under MBSA.
   - D. American-British-Canadian standards.
   - E. Inspection.
   - F. Statistical quality control.
   - G. Proofing.
   - H. Supply of proof materials and special testing equipment, including industrial and other requirements.
   - I. Gaging.
   - J. Standardization, design, procurement, inspection, modification, storage and issue of Ordnance final inspection gages, gage and gage laboratory equipment and standard measuring equipment, including procurement of certain field service gages.
   - K. Inspection handbooks and standard inspection procedures.
   - L. Specialized training courses for inspectors.
   - M. University gage laboratories.
   - N. Screw thread program.
   - O. Budget estimates, funding and mobilization planning, as required, for A through N above.
2. Responsible for functioning as an Ordnance clearing house for proving ground proofing problems.

EXPEDITING SECTION

1. Responsible for Ordnance-wide supervision, administration, and coordination of the following functions as required in the operation of the Ordnance Corps:
   - A. The Controlled Materials Plan.
   - B. Industrial priorities and ratings as applied to procurement and production.
   - C. Expediting deliveries of materials and production equipment for Ordnance contractors and government installations.
   - D. Implementation of such limitations and conservation directives as may be necessary.
2. Represent the Ordnance Corps in liaison with higher headquarters on all matters concerning the above functions.
3. Coordinate preparation and administer the use of urgency lists.

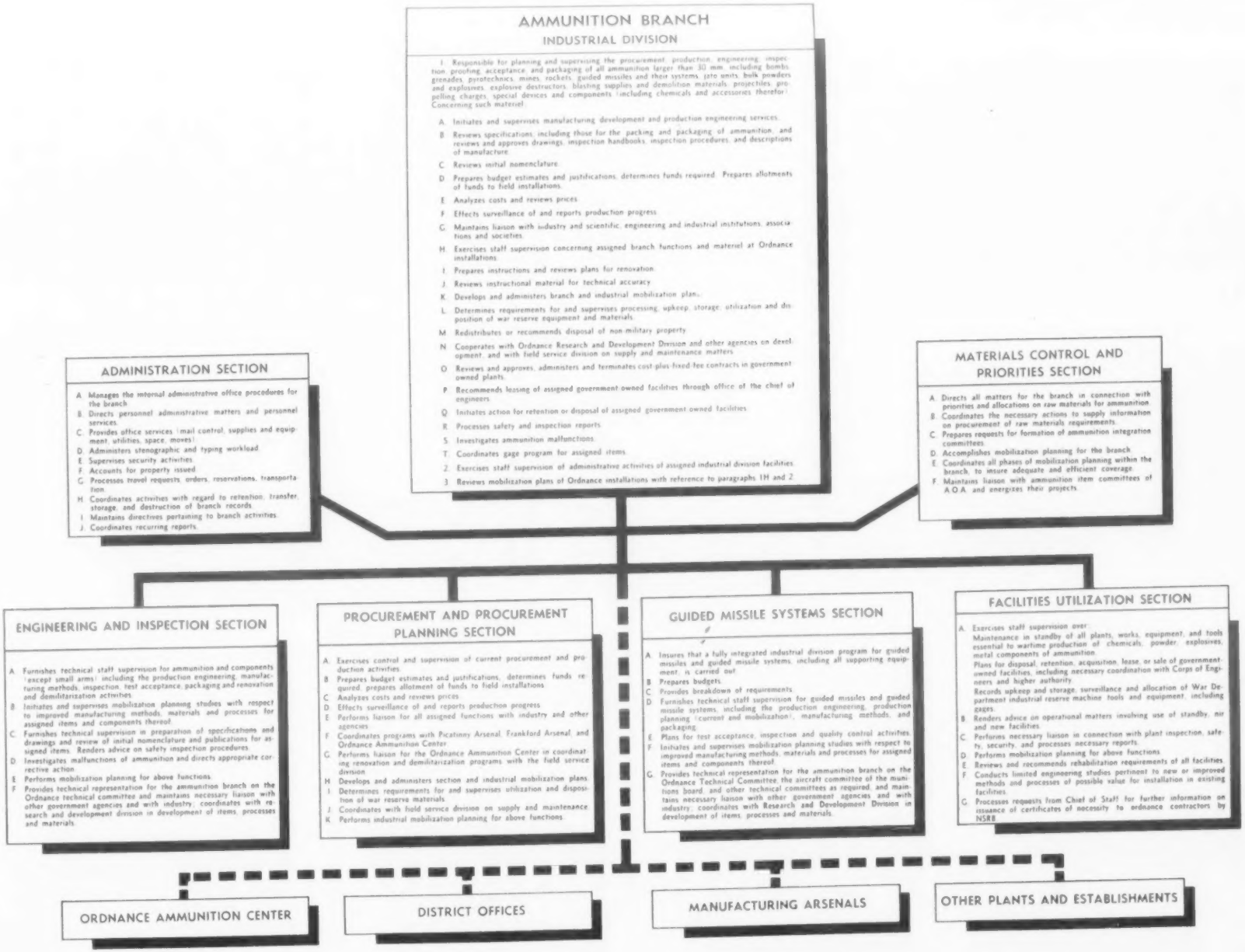

AMMUNITION BRANCH
INDUSTRIAL DIVISION
1. Responsible for planning and supervising the procurement, production, engineering, inspection, proofing, acceptance, and packaging of all ammunition larger than .30 mm, including bombs, grenades, pyrotechnics, mines, rockets, guided missiles and their systems, jato units, bulk powders and explosives, explosive destructors, blasting supplies and demolition materials, projectiles, propelling charges, special devices and components (including chemicals and accessories therefor) Concerning such materiel:
A. Initiates and supervises manufacturing, development and production engineering services.
B. Reviews specifications, including those for the packing and packaging of ammunition, and reviews and approves drawings, inspection handbooks, inspection procedures, and descriptions of manufacture.
C. Reviews initial nomenclature.
D. Prepares budget estimates and justifications, determines funds required. Prepares allotments of funds to field installations.
E. Analyzes costs and reviews prices.
F. Effects surveillance of and reports production progress.
G. Maintains liaison with industry and scientific, engineering and industrial institutions, associations and societies.
H. Exercises staff supervision concerning assigned branch functions and materiel at Ordnance installations.
I. Prepares instructions and reviews plans for renovation.
J. Reviews instructional material for technical accuracy.
K. Develops and administers branch and industrial mobilization plans.
L. Determines requirements for and supervises processing, upkeep, storage, utilization and disposition of war reserve equipment and materials.
M. Redistributes or recommends disposal of non-military property.
N. Cooperates with Ordnance Research and Development Division and other agencies on development, and with field service division on supply and maintenance matters.
O. Reviews and approves, administers and terminates cost-plus-fixed-fee contracts in government-owned plants.
P. Recommends leasing of assigned government-owned facilities through office of the chief of engineers.
Q. Initiates action for retention or disposal of assigned government-owned facilities.
R. Processes safety and inspection reports.
S. Investigates ammunition malfunctions.
T. Coordinates gage program for assigned items.
2. Exercises staff supervision of administrative activities of assigned industrial division facilities.
3. Reviews mobilization plans of Ordnance installations with reference to paragraphs 1H and 2.
ADMINISTRATION SECTION
A. Manages the internal administrative office procedures for the branch.
B. Directs personnel administrative matters and personnel services.
C. Provides office services (mail control, supplies and equipment, utilities, space, moves).
D. Administers stenographic and typing workload.
E. Supervises security activities.
F. Accounts for property issued.
G. Processes travel requests, orders, reservations, transportation.
H. Coordinates activities with regard to retention, transfer, storage, and destruction of branch records.
I. Maintains directives pertaining to branch activities.
J. Coordinates recurring reports.
MATERIALS CONTROL AND PRIORITIES SECTION
A. Directs all matters for the branch in connection with priorities and allocations on raw materials for ammunition.
B. Coordinates the necessary actions to supply information on procurement of raw materials requirements.
C. Prepares requests for formation of ammunition integration committees.
D. Accomplishes mobilization planning for the branch.
E. Coordinates all phases of mobilization planning within the branch, to insure adequate and efficient coverage.
F. Maintains liaison with ammunition item committees of A.O.A. and energizes their projects.
ENGINEERING AND INSPECTION SECTION
A. Furnishes technical staff supervision for ammunition and components (except small arms) including the production engineering, manufacturing methods, inspection, test acceptance, packaging and renovation and demilitarization activities.
B. Initiates and supervises mobilization planning studies with respect to improved manufacturing methods, materials and processes for assigned items and components thereof.
C. Furnishes technical supervision in preparation of specifications and drawings and review of initial nomenclature and publications for assigned items. Renders advice on safety inspection procedures.
D. Investigates malfunctions of ammunition and directs appropriate corrective action.
E. Performs mobilization planning for above functions.
F. Provides technical representation for the ammunition branch on the Ordnance technical committee and maintains necessary liaison with other government agencies and with industry; coordinates with research and development division in development of items, processes and materials.
PROCUREMENT AND PROCUREMENT PLANNING SECTION
A. Exercises control and supervision of current procurement and production activities.
B. Prepares budget estimates and justifications, determines funds required, prepares allotment of funds to field installations.
C. Analyzes costs and reviews prices.
D. Effects surveillance of and reports production progress.
E. Performs liaison for all assigned functions with industry and other agencies.
F. Coordinates programs with Picatinny Arsenal, Frankford Arsenal, and Ordnance Ammunition Center.
G. Performs liaison for the Ordnance Ammunition Center in coordinating renovation and demilitarization programs with the field service division.
H. Develops and administers section and industrial mobilization plans.
I. Determines requirements for and supervises utilization and disposition of war reserve materials.
J. Coordinates with field service division on supply and maintenance.
K. Performs industrial mobilization planning for above functions.
GUIDED MISSILE SYSTEMS SECTION
A. Insures that a fully integrated industrial division program for guided missiles and guided missile systems, including all supporting equipment, is carried out.
B. Prepares budgets.
C. Provides breakdown of requirements.
D. Furnishes technical staff supervision for guided missiles and guided missile systems, including the production engineering, production planning (current and mobilization), manufacturing methods, and packaging.
E. Plans for test acceptance, inspection and quality control activities.
F. Initiates and supervises mobilization planning studies with respect to improved manufacturing methods, materials and processes for assigned items and components thereof.
G. Provides technical representation for the ammunition branch on the Ordnance Technical Committee, the aircraft committee of the munitions board, and other technical committees as required, and maintains necessary liaison with other government agencies and with industry; coordinates with Research and Development Division in development of items, processes and materials.
FACILITIES UTILIZATION SECTION
A. Exercises staff supervision over:
Maintenance in standby of all plants, works, equipment, and tools essential to wartime production of chemicals, powder, explosives, metal components of ammunition.
Plans for disposal, retention, acquisition, lease, or sale of government-owned facilities, including necessary coordination with Corps of Engineers and higher authority.
Records upkeep and storage, surveillance and allocation of War Department industrial reserve machine tools and equipment, including gages.
B. Renders advice on operational matters involving use of standby, nir and new facilities.
C. Performs necessary liaison in connection with plant inspection, safety, security, and processes necessary reports.
D. Performs mobilization planning for above functions.
E. Reviews and recommends rehabilitation requirements of all facilities.
F. Conducts limited engineering studies pertinent to new or improved methods and processes of possible value for installation in existing facilities.
G. Processes requests from Chief of Staff for further information on issuance of certificates of necessity to ordnance contractors by NSRB.
ORDNANCE AMMUNITION CENTER
DISTRICT OFFICES
MANUFACTURING ARSENALS
OTHER PLANTS AND ESTABLISHMENTS

Table I—Partial List of Unified Military Standards Now Available from the Government Printing Office, Washington 25, D. C.

NAME		CAT. NO.	PRICE
JAN-STD-1	General Drawing Practice	M5.8:1	$ .20
MIL-STD-2A	Drawing Sizes	D3.7:2A	.10
JAN-STD-3	Format for Production Drawings	M5.8:3	.10
JAN-STD-4	Format for Construction Drawings	N20.28:4	.15
MIL-STD-8	Dimensioning and Tolerancing	D3.7:8	.25
MIL-STD-10	Surface Roughness, Waviness and Lay	M5.8:10	.10
JAN-STD-12	Abbreviations for Use on Drawings	N20.28:12	.20
JAN-STD-14	Architectural Symbols	M5.8:14	.10
JAN-STD-15	Electrical and Electronic Symbols	M5.8:15	.45
JAN-STD-16	Reference Designations for Electrical Symbols	D3.7:16	.10
MIL-STD-17	Mechanical Symbols	D3.7:17	.30
MIL-STD-18	Structural Symbols	M5.8:18	.15
MIL-STD-19	Welding Symbols	M5.7:19	.30
MIL-STD-20	Welding Terms and Definitions	D3.7:20	.60
MIL-STD-23	Non-Destructive Testing Symbols	D3.7:23	.15
MIL-STD-24	Revision of Drawings	D3.7:24	.05
MIL-STD-101	Color Code for Compressed Gas Cylinders and Pipelines	M5.8:101	.35
JAN-STD-102	Anti-Friction Bearing Identification Code	N20.28:102	.70
MIL-STD-105A	Sampling Procedures and Tables for Inspection by Attributes	D3.7:105A	.30
MIL-STD-107	Preparation of Machine Tools and Manufacturing Equipment for Extended Storage	D3.7:107	.70
MIL-STD-110	Go Plain Cylindrical Plug Gages	D3.7:110	1.75
MIL-STD-111	Not Go Plain Cylindrical Plug Gages	D3.7:111	1.50
MIL-STD-112	Go Plain Ring Gages	D3.7:112	1.75
MIL-STD-113	Not Go Plain Ring Gages	D3.7:113	1.50
MIL-STD-120	Gages Inspection Standard	D3.7:120	1.00
MIL-STD-125	Standard Guides for Preparation of Item Descriptions	D3.7:125	3.50
MIL-STD-150	Photographic Lenses	D3.7:150	.25

Boom-or-Bust Business

(Continued from page 62)

tion of the operating commodity branch.

Behind the application of gages in Ordnance are the gage laboratories, the most important of which is at Frankford Arsenal. This laboratory, under the technical direction of Production Service while under Ordnance department administration of the Arsenal, undertakes gaging research and reviews special gage designs with the idea of avoiding duplication of design.

Tied in with gage design and control are the university gage laboratories, established during World War II to facilitate training, gage checking and research. As gage checking establishments, they are supplied with machinery and equipment from the Ordnance reserves. Schools selected for laboratory sites are chosen not only on the basis of technical level, but in addition for their proximity to large industrial centers. Activities of the university laboratories are directed by the governing Ordnance District, and the establishments, staffed by qualified technicians, are available when needed for gage checking, etc.

Ammunition Branch, Ordnance Corps

Operations of the Industrial Division of the Ordnance Corps have been traced through their branches on a policy level—to tie these activities down to a working level, some of them will be reviewed in a specific commodity branch: Ammunition.

The Ammunition Branch of the Industrial Division of Ordnance, under Brig. Gen. Merle H. Davis, is an operating entity responsible for the production of all Army ammunition except that for small arms. It is equivalent to an operating division of an extremely large corporation, developing its own designs, production methods, quality and inspection routines, materials and parts procurement, and prime and subcontractor assistance.

As in the basic Ordnance Corps structure, responsibility for these phases of manufacturing centers in an Industrial Division, are further divided into five operating sections. To a great extent, this Industrial Division functions in the same manner with relation to its manufacturing establishments—centers and arsenals—as the Production Service Branch operates with respect to the Ammunition Branch. Operations here, in other words, are on a policy level, with operating authority delegated, as far as possible, to the working level.

Plants and Arsenals

Facilities of the Ammunition Branch consist of the arsenals and the government-owned contractor-operated ammunition plants. Government loading plants receive the metal parts and assemblies which go into heavy ammunition, load the shells and perform final assembly.

Three main organizations in the field handle the bulk of this work. The Ordnance Ammunition Center at Joliet, Illinois, is the primary agency. It handles the procurement breakdown of all ammunition and components, and, through the structure outlined earlier, works through the various Ordnance Districts to procure metal components from private contractors. As a center it is also responsible for production scheduling of parts from these contractors into the government-owned contractor-operated loading plants.

Picatinny Arsenal is the second of these field organizations. Here almost all engineering, tool engineering, development of inspection procedures and research are centered.

Frankford Arsenal completes the list—it handles certain complete ammunition jobs, such as the design and production of some types of cartridge cases and shells.

Engineering designs originate in the field, are approved by the Industrial Division. Minor engineering changes can be made in the field—major changes are referred to the Industrial Division. On specific manufacturing problems, the Ammunition Branch has operating responsibility, with correlation of policy a cooperative function with the Production

Service Branch, Industrial Division

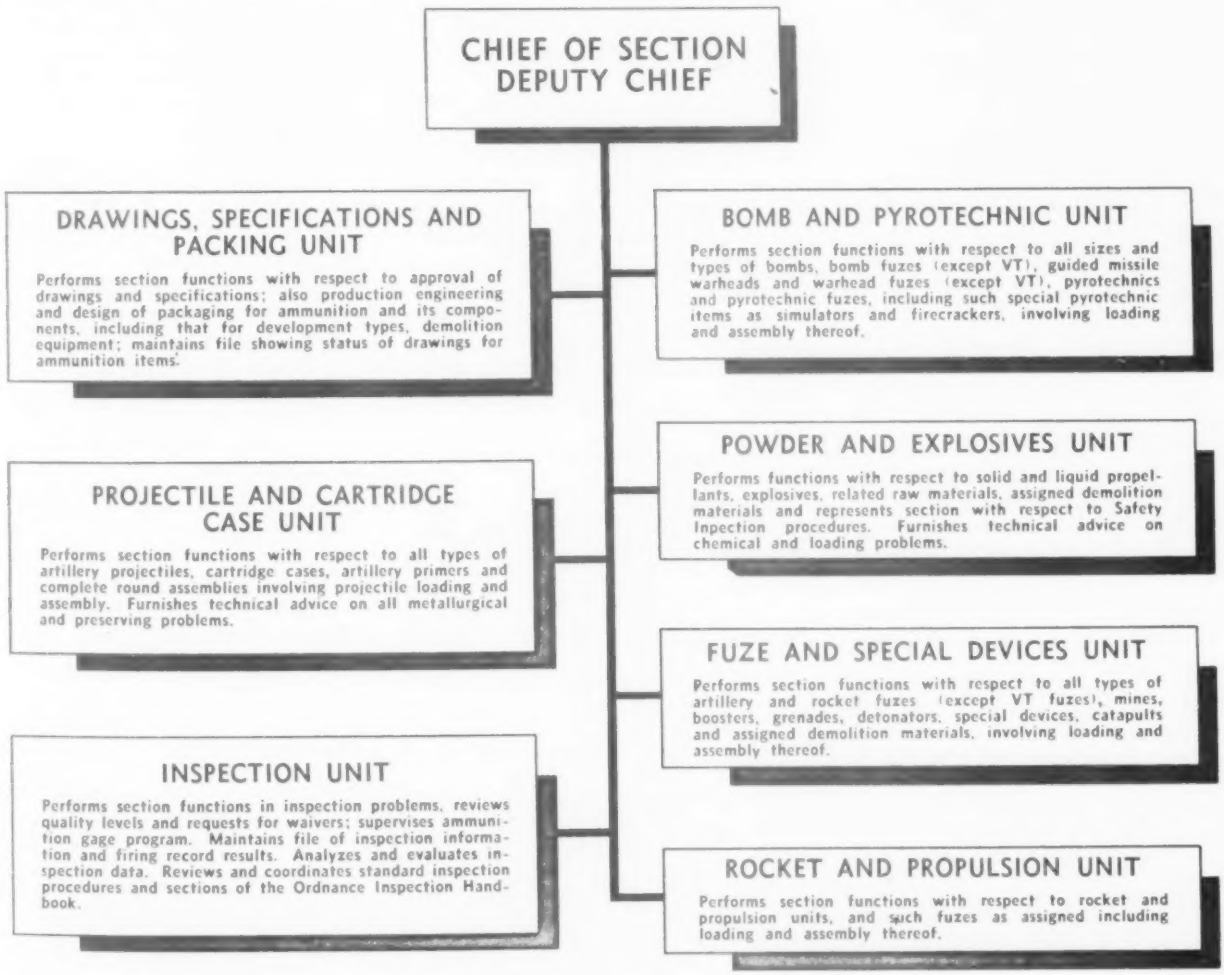
Coordination of the responsibilities of the Ammunition Center at Joliet and those of the mission arsenals about a year ago has resulted in a well-defined operating structure. While Ordnance arsenals are important manufacturing centers during peacetime, their wartime output amounts to only a small percentage of the total arms production required. Thus prime responsibility for mass production of materiel rests with the Ammunition Center, and specific projects are assigned to the arsenals for research and development, in addition to their actual manufacturing.

In practice, a new item goes to its assigned mission arsenal for engineering and development as an experimental item, then theoretically to the Center when ready for full production. The latter phase has been upset by Korea, which forced many items not yet out of the experimental stage into full production. The result has been that the Center is in full production on Items, which are ordinarily part of research and development.

Inspection and quality control we have seen on the Production Service level. As pointed out earlier, the Ammunition Branch has the responsibility for developing such procedures as are required for its own work. Here also authority is delegated, so far as possible, to the operating organizations. Inspection in contractors' plants, for example, is under the direction of the chief inspector of the Ordnance District who, for interpretation of regulations, goes to the Ammunition Center. Final authority is the Ammunition Branch of the Industrial Division. Actual breakdown here is that minor decisions can be made at the District level; more serious matters are handled by the Center or Picatinny Arsenal; and major decisions are referred to the Industrial Division of the branch for decision.

Thus functions one of the world's greatest boom-or-bust businesses—an organization which must operate effectively on a skeleton basis for the greater part of its existence, then in the space of a few months throw men and machines into astronomical production.

This chart shows the organization and duties of the Engineering and Inspection Section, Ammunition Branch, Industrial Division.



University of Illinois Holds Tool Engineering Meeting

By Nancy L. Morgan

Engineering professors at the University of Illinois and 150 ASTE members met October 27 in Urbana, Ill., to exchange their specialized knowledge on tool engineering, the first such conference held at the university.

The academic-industrial combination, vital to the services and over-all goals of the Society, wrote another page of progress on ASTE and university cooperation in the field of engineering education.

Dean Welcomes ASTE

"Participation in this conference is part of our program to increase the skill and number of engineers," said W. L. Everitt, dean of the College of Engineering and director of the Engineering Experiment Station, in his welcoming address before the luncheon meeting at the Urbana-Lincoln Hotel. "The excellent attendance is most gratifying to the university, as it must be to you in ASTE, your directors, officers and program committee."

Emphasizing the importance of the Tool Engineering Conference, Dean Everitt said, "Today's technical sessions and discussions, geared to your major interest area, help fill the need for growth in the tool engineering profession. The knowledge gained will also be reflected in three phases of university operation—instruction of students, research developments, and in other programs designed for the interchange of academic and industrial ideas."

N. A. Parker, head of the Department of Mechanical Engineering and Safety Education, presided at the luncheon. Also on the program were A. O. Schmidt, research engineer with Kearney and Trecker Corp., Milwaukee, Wis., and T. J. Donovan, Jr., director and third vice president of ASTE. Mr. Schmidt reported on the Paris machine tool show and tool engineering in Europe.

"The Good Old Days" was Mr. Donovan's topic. He compared today's living with that of 100 years ago. "We can have better tomorrows by facing the future with courage and calmness, by using the ability and ingenuity for which Americans are famous."

He reviewed the growth of ASTE services: the Research Foundation, the five scholarships offered by the National Education Committee and the more than 30 individual chapter awards, the *Tool Engineers Handbook*, the educational opportunities at technical meetings, and THE TOOL ENGINEER.

Mr. Donovan gave his well-known quiz program at the evening banquet. Roger F. Waindle, second vice president, presided.

Joint Sponsorship

Four technical sessions, conducted by the Department of Mechanical Engineering in cooperation with the Illinois chapters of the Society, were presented during the conference. Invitations were extended to Chicago, Rockford, Springfield, Peoria, Tri-Cities and Decatur members and to other ASTE members within traveling distance.

"Recent Developments and Applications of Metal Cutting Research" were discussed at a morning session by Mr. Schmidt, M. E. Merchant, senior physicist at Cincinnati Milling Machine Co., and K. J. Trigger, professor of mechanical engineering at the university.

"Electronics Applied to Machine Tools" was the topic for H. V. Loeppert, vice president of Boyd Wagner Co.; G. H. Fett, professor of electrical engineering; and T. E. Johntz, application engineer at General Electric Co. in Chicago.

Mr. Trigger led a round table discussion on metal cutting problems with Bernard Better, director of research, Scully-Jones and Co. of Chicago; Harry W. Highriter, technical director of Vascoloy-Ramet Corp. in Waukegan, W. H. Oldacre, president of the D. A. Stuart Oil Co. and Mr. Merchant.

H. Dale Long, president of Scully-Jones and Co.; W. E. Thomas, assistant professor of accounting at the university; and J. J. Winkler, methods supervisor, Barber-Colman Co. in Rockford, discussed considerations in the depreciation and replacement of machine tools and equipment.

Doyle Heads Committee

Organizational work was done by L. E. Doyle, associate professor of mechanical engineering at the university. Serving with him were B. T. Chao, research associate in mechanical engineering; G. W. Harper, associate professor of mechanical engineering and safety education; Mr. Trigger and L. C. Pigage, associate professor of mechanical engineering.

Nearly 50 ASTE wives toured the campus, visited the Union building, art and ceramics departments. Their program, under the direction of Mrs. L. E. Doyle, also included the luncheon and banquet at the hotel.

H. Dale Long (left) introduces technical speakers J. J. Winkler of Barber-Colman Co. and Prof. W. E. Thomas.

At the speakers' table are: Mr. Long (standing, left) Dean W. L. Everitt, Prof. K. J. Trigger, R. F. Waindle and Prof. L. E. Doyle. Seated: T. J. Donovan, Jr., N. A. Parker and A. O. Schmidt.

Discussion leaders at the round table on metal cutting problems, held at the University of Illinois Tool Engineering Conference, compare notes before their meeting gets underway. From the left are: W. H. Oldacre, president of the D. A. Stuart Oil Co.; Harry W. Highriter, technical director for Vascoloy-Ramet Corp.; K. J. Trigger, professor of mechanical engineering; A. O. Schmidt, research engineer at Kearney & Trecker Corp.; M. E. Merchant, senior physicist at Cincinnati Milling Machine Co.; and Bernard Better, director of research at Scully-Jones and Co.

Schmidt Reviews Paris Show For ASTE

Vast improvement in European machine tools during the last three years and expansion of the industry was noted at the Paris Machine Tool Show by A. O. Schmidt, research engineer at Kearney & Trecker Corp. in Milwaukee, Wis., who gave his report October 27 at the Urbana conference. More than 600 companies from 12 countries exhibited at the show, held September 1 through 10.

"The majority of machines were shown by French, German and Italian manufacturers, with only a few British and American firms represented," he said.

A. O. Schmidt

"European machine tools are coming to this nation in ever increasing numbers because of the earlier delivery dates promised. The British, busy with their rearmament program, ordered large quantities of Italian machine tools, generally available in less time than the one to three years quoted for French, German and Swedish products."

High Rating for European Machine Tools

European competition for almost every type of machine tool built in this country was reported. Their tools rate high in design, appearance and quality. Milling machines incorporate good design and power drive sufficient for high speed metal cutting, lathes have many automatic features, jig borers and grinding machines are of excellent quality.

Tool builders in Europe are trying to reach the performance level achieved by Americans. Well aware of their shortcomings, they are cooperating with laboratories of technical universities and, in most cases, maintain their own laboratories staffed by outstanding scientists and research workers.

Cites Research Programs

Mr. Schmidt described the research activities of men he visited in London, Paris, Delft, Copenhagen, Stockholm, Hannover, Zurich and Turin. They were working on power determination in machine tools, measurements of cutting forces and effects of cutting speed, designs for better production, accuracy of measurements and reduction of handling time.

Standardization has been carried out to such a degree that one company may manufacture all the handwheels and gears used in a large number of machine tool factories.

Carbides are rated as generally as good as those used in the United States, but are more expensive. New types of ceramic tool materials have been developed in England but are useable at this time only for the machining of plastics.

Impressed by Factories

"I had the opportunity to tour a number of European machine tool plants and was much impressed by their equipment, efficiency, organization and working methods," Mr. Schmidt said. "They rely much more on the skill of their craftsmen to produce a good machine tool. Numerous operations which require general machining in this country are still performed by hand. However, many of the tool builders have studied plant operation on visits to the United States and I believe they will soon adopt many of our methods."

National Officers Attend Long Beach Meeting

Long Beach, Calif.—Sixty Long Beach members met October 10 at Ivan's in Lynwood to participate in the quiz program staged by Thomas J. Donovan, Jr., director and third vice president of the Society. He gave a silver dollar encased in leather bearing the chapter's name and number to each contestant.

Other guests at the meeting were Ben Hazewinkel, ASTE director, and Les Hawes, past chairman of Los Angeles' chapter.

Michigan State Graduate Appointed News Editor

Nancy L. Morgan has been named editor of the ASTE news section of THE TOOL ENGINEER. A gradute of Michigan State College, she has a background of newspaper and public relations experience. She has edited news for a weekly paper in suburban Detroit and later directed the public relations program for the Lansing (Mich.) Community Chest. As staff writer for the United Foundation, Miss Morgan wrote newspaper articles and advertising copy on 150 health and community services in the Detroit area.

Nancy L. Morgan

Past President Greets Chapter at Ft. Wayne

Ft. Wayne, Ind.—Former president of the ASTE, Otto Winter was on hand to meet Ft. Wayne members at the meeting October 10. He was the officiating officer when the chapter received its charter back in 1942.

Capt. John Hazelett, head of the local police records and identification bureau, spoke on his law enforcement experiences.

John Kaske, regional manager of Eutectic Welding Alloys Corp., discussed the latests techniques of gas and electric arc welding in the repair and salvaging of tools and dies. Eutectic sales engineer Kenneth Martin gave a demonstration of arc welding and torch brazing.

A business session preceded the program.

On October 26 about 120 Ft. Wayne members and friends toured the plant of the Warner Gear Co. in Muncie.

First in the Nation

Tool Engineering Degree Offered

Utah State Agricultural College this year will become the first college or university in the United States to offer a four-year course which grants a bachelor of science degree in tool engineering.

"The college is expanding its tool engineering to this record level in keeping with the rapid industrial growth in Utah," said Professor Frederick Preator, head of the Tool Engineering Department.

"With all the students we train, we have never yet been able to satisfy all the demands made by industry for tool engineers. Right now, we have requests from aircraft companies, from the auto industry, and many other manufacturing concerns throughout the country."

Prof. Preator said "Utah State is fortunate in being able to serve the tool engineering profession by providing this outstanding four-year course."

Seven major phases of tool engineering taught at USAC are: machine and cutting tool design; jig, fixture and gage design; die design for sheet metal fabrication; mechanical forging, die design and equipment; permanent molding plastics and pressure casting design; and welding methods and manufacturing analysis.

Other College Courses

Other educational progress in tool engineering was scored this year when the University of Michigan initiated a new program leading to a degree in industrial engineering.

The curriculum includes courses in structure of metals, design for production, process instrumentation and a wide range of other subjects. The production engineering department expects to offer advanced graduate work and masters degrees in the near future.

College training in tool engineering has been stimulated further by ASTE scholarships offered by some 30 chapters of the Society and five national ASTE awards made annually.

In Boston, Professor Prescott Smith, chairman of the ASTE chapter, recently presented two scholarships of $240 each to Warren E. Benson, Jr., and Marcus Slobins, both of Boston, for continued engineering study at Northeastern University. Dean Alexander of the university spoke in behalf of Northeastern's responsibility in establishing a foundation on which industry may build its future tool engineers.

St. Louis ASTE members voted unanimously at their October meeting to establish two scholarships of $300 each for students at St. Louis and Washington Universities.

Competitive examinations sponsored by the Chicago chapter helped the educational committee select recipients of scholarships to the Allied Institute of Technology. Winners were: Ted Brolund of Rockford, Franz Kufeld of Forest Park, and Jack Allen of Decatur.

Philadelphia members received a grant in September for their educational fund from the Sheffield Foundation.

New England Meeting

In Hartford, Conn., national representatives of the Society met October 13 with delegates from five New England chapters—Boston, Fairfield County, Hartford, Springfield, Mass., and Worcester—to discuss coordination of chapter and national educational programs.

Scholarship plans were discussed with J. J. Demuth, ASTE president; Joseph P. Crosby, director; Professor Jay N. Edmondson, chairman of the national educational committee; and Arthur R. Diamond, national educational committee member.

Arrangements were also made for completing a definite program for cooperating with colleges and universities in establishing tool engineering courses.

Baltimore Elects New Vice Chairmen

Baltimore, Md.—Two new officers are listed on the roster of the Baltimore chapter as a result of elections held October 3. Leon Laux and Donald E. Wernz were installed as first and second vice chairmen at a meeting at the Engineers Club.

The coffee speaker, O. W. Crowder, president of the Maryland Ornithological Society, gave interesting highlights on "Local Birds, Their Habits and Habitats".

H. I. Grief, regional director of the Eutectic Welding Alloys Corp., lectured on "New Welding Methods and Alloys for Salvage of Tools and Dies". He covered numerous phases of tool and die salvage, giving many helpful hints on when to pre-heat and the application of cushioning techniques.

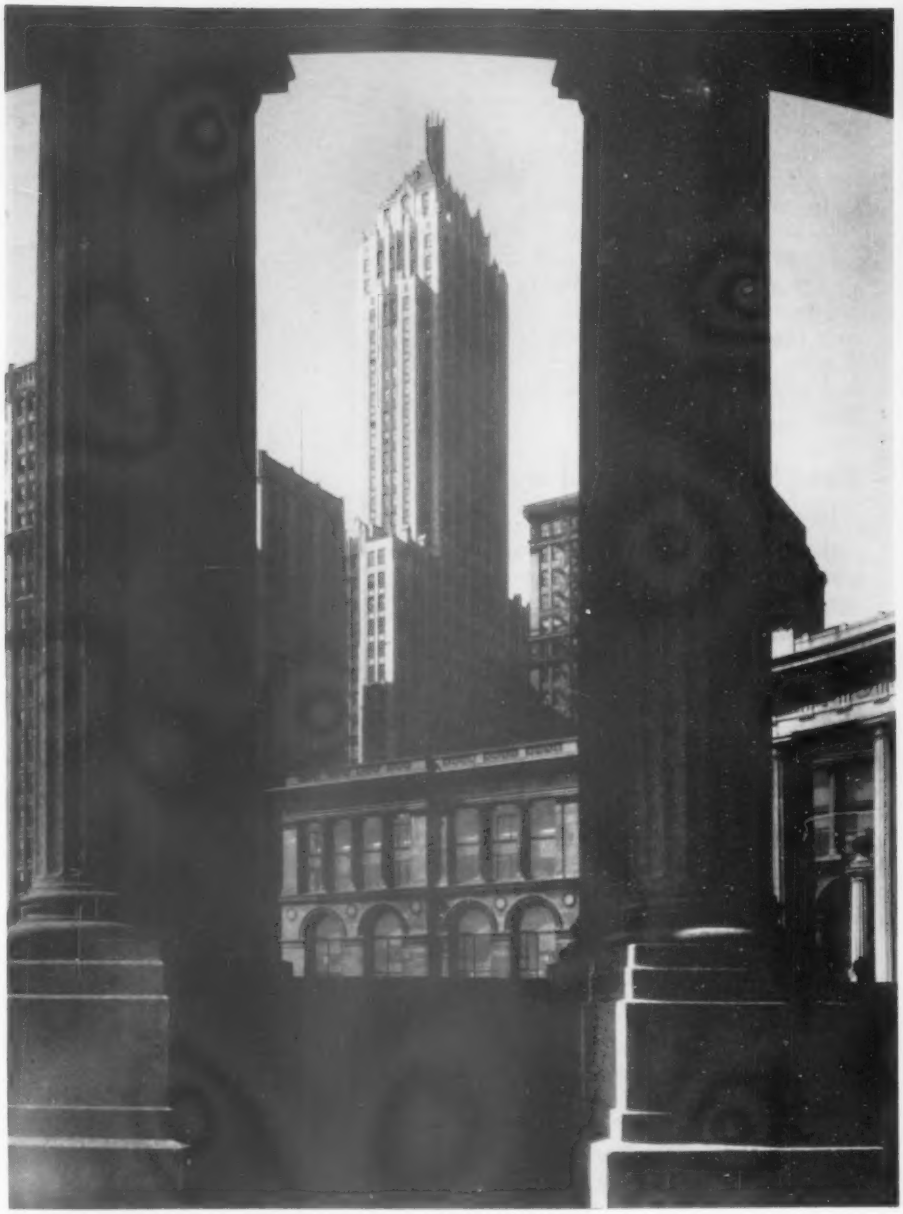
New Post for R. A. Cole

Raymond A. Cole was recently named to the vice presidency of the Production Machine Co. of Greenfield, Mass. An authority on precision grinding machinery, he has been actively associated with the machine tool industry, primarily in the New England states, for many years.

He has served as committee head and chapter chairman of the Worcester ASTE.

Faculty members of the Tool Engineering Department at Utah State Agricultural College, left to right, Prof. Karl Somers, Prof. Frederick Preator and Prof. Merrill Shaw, map plans for expanded courses. The college is the first school in the country to offer a major degree in tool engineering.

CHICAGO 1952



CHICAGO, FAMOUS the world over as a convention city, plays host on March 17-21 to the 1952 ASTE Industrial Exposition. The magnificent sweep of lake front; the intense activity of the reknowned 'loop' and the fabulous marts of commerce lend a fitting backdrop for what promises to be the greatest show in ASTE's history.

As the industrial and transportation hub of the midwest, Chicago is a 'natural' to provide the facilities to welcome this biennial event of the American Society of Tool Engineers. The capacity of this exciting city for people and events challenges comparison. Fine hotels and restaurants assure excellent accommodations. The attraction Chicago offers in the entertainment world guarantees top-flight amusement for ASTE's guests.

The vast roominess of the Chicago International Amphitheatre will make exhibits and displays more easily reached and more thoroughly enjoyed. Floor space measures over 130,000 square feet. More than 350 major manufacturers of production tools, machine tools and machine accessories will concentrate the developments of the past two years in displays stressing the functional operation and use of equipment.

The technical program of the 20th Annual ASTE Meeting will be held in conjunction with the Exposition. Five feature days are scheduled on Inspection and Quality Control, Metal Cutting, Materials Forming, Grinding and Finishing, and Machine Accessories, Drives and Controls.

These subjects will be covered in detail so that each segment of tool engineering will offer the maximum benefits of production progress to leaders in the profession.

Chicago's ASTE chapter assumes the privileges and obligations of host to the nation for the Industrial Exposition. The tool and production engineer for Sears, Roebuck & Co., M. A. Blue, has been appointed show chairman. He has ably delegated authority for the many responsibilities to a well-qualified crew of committee chairmen.

A. H. Ettinger, engineer for the Braeburn Alloy Steel Corp., heads the social programs committee. He will supervise a warm reception, banquets, informal luncheons, selected entertainment and the schedule of ladies' activities.

C. E. Ives, owner of the Ives Engineering and Planning Co., falls heir to the technical activities committee. He is well into the planning of technical sessions, plant tours and industrial films.

The vice president of the Enco Mfg. Co., G. J. Benes is lining up the functions of convention activity.

He and his committee will list bookings for hotel accommodations, arrange transportation, registration, tickets and the supplementary plans that are the foundation of a successful national gathering.

Hydraulic Transmission Topic at Peoria Meeting

Peoria, Ill.—Close to 150 members of the Peoria ASTE chapter heard J. A. Winters, senior project engineer with the Allison Division of General Motors Corp., at their October 2 meeting.

In his talk on "Hydraulic Transmission", he described the hydraulic torque converter and the manufacturing techniques, quality control and performance characteristics of the engine. Mr. Winters also covered design, operation, and economics of hydraulic transmissions.

Tool Steels Covered by Three Dayton Experts

Dayton, Ohio—One of the chapter's most successful technical sessions was held in Dayton October 8. Three outstanding speakers discussed the fundamental problems in the selection, classification, identification, and heat treatment of tool steels.

More than 100 members and guests were at the meeting.

Stanley Prance, chief metallurgist with the Inland Manufacturing Division of General Motors Corporation, chairman of Joint Industry Committee of General Motors, Chrysler, and Ford, and past chairman of American Society of Metals, covered classification and identification of tool steels. His close association with JIC added great interest to the discussion.

Roger Edmondson of Metallurgical Service and past ASM chairman, spoke on stress-relieving, heat treatment, and quenching. Stewart DePoy of the Dayton Forge and Heat Treat Company, and a past ASM chairman, summarized the previous talks and added his own observations.

ASTE Tour Largest Yet

Milwaukee, Wis.—The largest group ever to visit the International Harvester Co. in Milwaukee, 300 ASTE members and guests, toured the plant October 11. J. J. Dierbeck, Jr., public relations director, and W. C. Brice, assistant works manager of the company, conducted the tour.

Talks on Carbide Dies

Galt, Ont.—ASTE members of the Grand River Valley chapter met October 5 at Moffats Hall to hear Paul F. Rehner of the Allegheny Ludlum Steel Corp., Detroit, Mich. He spoke to about 50 members and guests on "Tungsten Carbide Dies". Movies illustrated the talk.

Other films were shown on travel and outdoor sports in Australia and Canada. A luncheon followed the program.

Tell Berna Addresses Worcester Meeting

Tell Berna

Worcester, Mass.—Tell Berna, general manager of National Machine Tool Builders' Association, was the technical speaker at Worcester's Executives Night held October 9 at the Sheraton Hotel. He dealt with the problems which confront machine tool manufacturers in meeting defense requirements.

Other speakers were Mayor Andrew B. Holmstrom of Worcester, who welcomed the group on behalf of the city and J. J. Demuth, Society president, who outlined the work that is being done by the national organization in promoting tool engineering.

Industrial Leaders Present

Guests at the speakers' table included Joseph P. Crosby and Victor M. Ericson, national directors of ASTE, and the following industrial leaders: Harry Arter, Arter Grinding Co.; Albert Gifford, Leland Gifford Co.; Peter Hoagland, Parker Mfg. Co.; William P. Coomey, Rice Barton Corp.; J. Chester Bath, John Bath & Co., Inc.; H. Clayton Kendall, Rockwood Sprinkler Co.; Albert T. Warman, Worcester Taper Pin Co.; Merton W. Clement, Jr., American Steel & Wire Co., A. Bradford Reed, Reed Rolled Thread Die Co., and C. K. Martineau, Telechron, Inc., all of Worcester and Erik O. Pierson of Whitin Machine Works, Whitinsville.

On behalf of the chapter, Chairman Ralph A. Baker presented Mr. Ericson, who was about to retire as a national director, with a matched set of golf clubs in recognition of his outstanding service to the Society.

Entertainment was provided by the Whitin Male Glee Club.

Yale & Towne Promotes Pantas and Bonine

Two promotions of ASTE members in the management of the locks and hardware manufacturing operations have been announced by the Yale & Towne Mfg. Co.

Leo J. Pantas, member of the Buffalo-Niagara Frontier chapter, was appointed general manager of the Stamford Division. He has managed two other divisions during the past six years.

Marvin C. Bonine of the Twin Cities chapter, who has been directing industrial relations at Stamford, was named to succeed Mr. Pantas as works manager of the Salem Division.

Naval Air Base Visited

San Francisco, Calif.—Golden Gate members toured the United States Naval Air Station at Alameda, Calif., as part of their meeting the afternoon of October 17. All the principal shops, the disassembly of the airframes, processing of parts and assembly of finished aircraft were seen.

Navy films were shown on completion of the tour. A steak dinner was served at the cafeteria on the base.

Racine Visits Brass Co.

Racine, Wis.—ASTE members in Racine were guests of the American Brass Co. at their October meeting. They were taken on a tour through the rolling mills and had an opportunity to see the manufacturing process in its many stages. The old and new method of drawing copper tubing was shown as were the high speed rolling mill and automatic draw-benches.

Sun Oil Representative Addresses Hamilton Group

Brantford, Ont.—A. D. Myler from the Sun Oil Co. spoke October 12 to members of the Hamilton District chapter and a number of members from the American Society of Lubricating Engineers on cutting fluids and their application to various cutting problems. The dinner meeting was held at the Brant Hotel.

The speaker stressed the high anti-weld properties of the sulphurized oils, and the superior cutting qualities and added tool life of soluble oils when the correct fluid is used. A question and answer period followed his talk.

On September 14 one hundred members gathered at Fischer's Hotel in Hamilton for the first meeting of the season. Chairman John Yorick called attention to the Society's objective of 20,000 members and presented pins to a dozen new members.

F. L. Hayden of the Steel Company of Canada gave the history of the manufacture of nails and screws, comparing the original methods of drawing wire to those used today. A plant tour followed his talk.

Williamsport Members Hear College Professor

Williamsport, Pa.—The engineer in charge of developing the centerless thread grinder, M. S. Gjesdahl, was the principal speaker at Williamsport chapter's October meeting held at the Anglers Club.

Mr. Gjesdahl, a professor of mechanical engineering at Pennsylvania State College, told of the development and history of the screw thread, the method which he selected for forming threads by centerless grinding and the problems encountered in the development of the machines.

J. Lee Hess, bridge engineer with the highway department, spoke briefly on the design and construction of the Greater Williamsport Market Street Bridge which spans the Susquehanna River.

Discusses Recruitment

Seattle, Wash.—Eighty members attended the October 16 meeting of the Society held at the Stewart Hotel. Guests present for the session were Thomas J. Donovan, Jr., director and third vice president of ASTE, and Les Hawes, National Membership Committee member and past chairman of the Los Angeles chapter.

Mr. Hawes spoke on recruiting new members and helped Mr. Donovan present his quiz program.

Oscar C. McDowell (left), first vice chairman of the Ft. Wayne chapter, welcomes the featured speaker, C. V. Salomon, to the September technical session. His talk on the history of blueprinting was heard by 60 members.

B. J. Forsher Reviews Symphony Activities

Poughkeepsie, N. Y.—A glimpse of the programs planned by the Poughkeepsie Symphony Orchestra was given to Mid-Hudson members by Bruno J. Forsher, a director of the Dutchess County Philharmonic Society and charter member of the ASTE. In a coffee talk at the October 9 meeting, he emphasized the excellent relaxation provided by music appreciation and encouraged greater participation in orchestra events.

The technical session, attended by 90 members, was presented by E. A. Brezina of the Cleveland Twist Drill Co. He showed two films on the use of twist drills and the art of reaming and later led a discussion on drill problems with P. H. Puckhaber and George P. Hauck of New York City.

A dinner at the Nelson House preceded the meeting.

Reviews Fundamentals of Resistance Welding

Washington, D. C.—The Everglades Room of the Annapolis Hotel was the scene of the first fall dinner meeting of the Potomac chapter. Close to 100 members and guests heard the outstanding technical program.

H. L. Tigges, past president of ASTE and director of the Material Working Equipment Division of the National Production Authority; Emil Kitzman, district membership chairman; and Captain Mel A. Peterson, USN, production officer at the naval gun factory, were among the guests.

The technical program on "Tooling for Resistance Welding" was presented by W. R. Plummer, vice president of the Progressive Welder Sales Co. His talk, amply illustrated with slides, included the different types of resistance welding, methods of locating parts for accurate welding, current flow through electrodes, welding speeds, machine capacities and other allied topics.

Executive Speaks on Centrifugal Castings

Tulsa, Okla.—Nathan Janco, president of the Centrifugal Casting Co. in Tulsa, gave an illustrated and informative lecture to ASTE members on the production of centrifugal castings. Close to 50 tool engineers and their guests were present at the meeting held October 11 at the Public Service Co. building.

Mr. Jancol's remarks concerned the machinery used and manufactured by his company to produce centrifugal castings. Slides of all types of casting machines were thoroughly described by the speaker.

National Membership Chairman Andrew B. Clark (second from left) points out features of the membership kit at Pittsburgh's chapter meeting held in October. Pictured with him (from the left) are: B. F. Hayes, Frank Glenn, Pittsburgh membership chairman, and Edwin Phillips. The meeting was held at the Sheraton Hotel.

Engineer Explains Constellation Overhaul

Kansas City, Mo.—A crowd of 70 members and guests heard Keith Horton, project engineer with Trans World Airlines, speak at the Kansas City meeting October 3. His topic was "Tooling for Aircraft Maintenance and Overhaul".

With slides for illustration, he described the use of special jigs and fixtures in assembly and disassembly operations in the 1,800 hour overhaul of a Constellation. Static and dynamic balancing of parts is done of several types of machines. One of them indicates the amount of out-of-balance, another is calibrated to show the depth and size of hole required to correct the out-of-balance condition.

The testing of hydraulic equipment was also pictured in slides. A tour of overhaul base closed the meeting.

Movies Shown on Grinding Wheels

Denver, Colo.—"Grinding Wheels" was the technical topic at the September meeting of ASTE members in Denver. Program speaker was Harry Brustline, factory representative of the Norton Co., who presented two color films on the grinding of carbide tools and the manufacture of grinding wheels.

Mr. Brustline thoroughly explained the various grades of wheels and their proper use. He later answered questions in a discussion period.

ASTE Handbook Awarded

Indianapolis, Ind.—John Huser won the *Tool Engineers Handbook* at the dinner meeting of the Indianapolis chapter held October 4. Approximately 100 Society members and their guests were on hand at the Athenaeum.

After a discussion of plans for participation in the South Central Area Conference, Bliss L. Bales, H. J. Smith and L. E. Kestler of the National Acme Co. in Cleveland discussed the development and tooling of the automatic screw machines.

Canadian Chapter Learns About Plastics

London, Ont.—Harry Whitehall, area membership chairman in Canada, was present for the first meeting of the 1951-52 season of the St. Thomas-London District.

Speakers on the evening's program were Nelce Taylor, service engineer of the Tennessee Eastman Co. of Cleveland, Ohio, and Charles Seay, district representative for the same firm.

Mr. Seay gave a short talk on the development of plastics and showed movies of the manufacturing stages in making Tenite.

In his talk on the basic fundamentals of producing plastics, Mr. Taylor stressed the important points on injection type molding. The gates and sprues must be located properly to avoid stress and strain at critical points on the piece.

Nearly 98 members and guests attended the meeting.

Scholarships Presented to Winners

Winners of state-wide examinations in Illinois, sponsored by the education committee of the Chicago chapter under the direction of Henry Katz, received their scholarship awards from Harry Lebeson, president of the Allied School of Mechanical Trades. Mr. Lebeson presented the scholarships in behalf of his school. Left to right are Ted Brolund of Rockford, Franz Kufeld of Forest Park and Jack Allen of Decatur. The awards are valued at $2,000. Nearly 150 ASTE members witnessed the presentations.

A discussion of the Aircraft Armament Division of Emerson Electric Mfg. Co. was presented in October to more than 100 St. Louis members by William L. Davis, chief engineer of the division. Colonel C. H. Morgan, division manager, also spoke at the technical session.

Machinery Editor Oberg Killed in Auto Accident

Erik Oberg, 63, consulting editor of *Machinery* and editor-in-chief of the magazine from 1918 to 1946, was killed October 29 in an automobile accident in Rockford, Ill.

Well-known throughout engineering circles, Mr. Oberg was editor and principal author of *Machinery's Handbook* and *Machinery's Encyclopedia* and nearly a dozen other books on engineering. He was a director of the Industrial Press and served as treasurer from 1906-1917.

Born in Sweden, Mr. Oberg received his education at Boras Technical College in Sweden, graduating with a mechanical engineering degree.

At the time of his death, he was a member of the American Society of Mechanical Engineers, the Society of Automotive Engineers and the American Society of Swedish Engineers.

Learn How Cyclotron Operates at University

Rochester, N. Y.—Dr. Lewis Conta, chairman of the Engineering Division at the University of Rochester, conducted ASTE members from the area on a tour of the university campus and buildings.

Staff members of the cyclotron department explained the working of the cyclotron. The university, outstanding in its nuclear physics research, has contributed much to this relatively new science.

In the Navy buildings, officers gave a working demonstration of the methods used in tracking down submarines with radar equipment.

Navy Officer Commends Washington Leadership

Springfield, Vt.—Commander A. M. Johnson, U.S.N., chief liaison officer between the Navy department and the National Production Authority's metal working division, was guest speaker October 10 at the Twin States' meeting honoring company executives held at the Chester Inn.

Comdr. Johnson called upon the 120 tool engineers present and their guests to "stand firmly behind the program developed to cope with the present emergency", strongly asserting that the leadership in Washington of such men as Charles E. Wilson, Clay Bedford and Manley Fleischman matches that of World War II. He said the present plan of mobilization is based upon a long-range program of becoming strong and staying strong, while maintaining a sound national economy.

Outlines Services

J. J. Demuth, ASTE president, reviewed the growth and history of the society, outlining the services provided to all members.

Executives present included: Russell E. Davis and James R. Conners of Springfield, Mass.; Sam J. Ashelford, Washington, D.C.; Holmes H. Whitmore, Walpole, N. H.; Henry Webster, Windsor, Vermont; Lt. Gov. J. B. Johnson, Springfield, Vt.; E. R. Fellows II, Springfield; C. H. Robbins, Keene, N. H.; Henry F. Runold, Cincinnati, Ohio; John C. Harry, Jr., Boston, Mass.; C. F. Bulotti, Jr., San Francisco, Calif.; and Kees Van Dipten, The Hague, Holland.

Executives' Night Draws 250 at Cleveland Meeting

Cleveland, Ohio — More than 250 plant executives and chapter members attended the dinner meeting held October 19 at the Cleveland Turners.

Arch T. Colwell, vice president and board member of Thompson Products, Inc., in Cleveland, spoke to the group. His talk on "Revolution in Aircraft Power Plants" covered in detail the many tool engineering problems solved the past few years in the development of aircraft power plants.

On September 14 the chapter inspected the manufacturing operations at the Cadillac Tank plant at the Cleveland-Hopkins Airport. Nearly 300 members saw units in operation performing multi-automatic drilling and grinding on the entire tank body.

Particularly impressive were the methods of applying counter pressure during welding of the tank assembly in order to prevent distortion.

Speakers at the Twin States' program honoring executives from local firms were: Robert W. Laffin (far left), first vice chairman; J. B. Johnson, lieutenant governor of Vermont; Commander A. M. Johnson, USN; J. J. Demuth, ASTE president; and Floyd J. McArthur, chapter chairman.

Navy Shipyard in Portsmouth Visited

Portsmouth, N. H.—More than 100 members of the Granite State chapter of ASTE participated in the tour of the Portsmouth Naval Shipyard on October 9.

Navy guides conducted them through the shops where dies, taps, reamers and special tools are made. Visitors had the opportunity to study all forms of machine tools, including horizontal and vertical boring mills, large radial drills, all types of gear shapers, lathes and large planers.

Donovan Speaks At San Diego Meeting

San Diego, Calif.—Guests from Los Angeles and members of the American Society of Metals joined San Diego's ASTE chapter for a meeting October 9. Speaker for the evening was Thomas J. Donovan, Jr., national director and third vice president of the Society.

He spoke on "Common Sense in Heat Treating" and later answered questions from the audience. A membership discussion closed the program.

Tour Rockford Plant

Rockford, Ill.—A technical program, smorgasbord dinner and plant tour of the Sundstrand Machine Co. made up the list of activities at the Rockford ASTE meeting held October 11.

The tool engineers first heard a talk by L. H. Schuette, vice president and division manager. He discussed the hydraulic transmission used to drive the generators which furnish all of the electric power in the giant B-36 bombers.

After Mr. Schuette's talk, ASTE members were divided into small groups for conducted tours through the plant. The factory inspection was followed by a smorgasbord dinner for the 150 tool engineers served in the engineering department.

M. F. Judson Lectures

Fond du Lac, Wis.—The technical program at the October 12 meeting of the ASTE chapter in Fond du Lac was presented by Malcolm F. Judkins, chief engineer for the Firth Sterling Steel and Carbide Corp.

Boston Chairman Awards Two Scholarships

Prof. Prescott Smith, chairman of the Boston ASTE chapter, presents two scholarship awards to Northeastern University students Marcus Slobins (left) and Warren E. Benson, Jr. The awards, valued at $240, are made annually as part of the chapter's educational program.

Red Cross Speaker Tells of Plasma Shortage

Hartford, Conn.—"The need for blood plasma is urgent," said Dr. E. Clair Rankin, medical director of the Connecticut Regional Blood Program of the American Red Cross, in a talk before the Hartford chapter at the October meeting. He told ASTE members what happens to the blood they donate and described the critical shortages now facing the Red Cross.

At the technical session, Charles L. Sadon spoke on jet engine tooling. He is a manufacturing engineer presently developing new production methods at the Aircraft Gas Turbine Division of the General Electric Co.

Ford Sends Millar to Australian Subsidiary

Andrew Millar, formerly an assistant general superintendent with Ford of Canada, is now general superintendent of the Ford Motor Company of Australia. He joined the company in 1940, during the war became general foreman of the rezeppa joint department, was later named general foreman of the rear axle parts department and was appointed superintendent.

Mr. Millar was a member of the Windsor ASTE chapter.

Obituaries

Edward M. Beyma

Edward M. Beyma, 49, president of the Adjusto Hook Co. in Berkley, Mich., died September 21. He was a charter member of the Detroit chapter and served two terms of office on the Society's national board of directors.

Born in Saginaw, Mich., Mr. Beyma completed his two-year apprentice period when he was 18 and went to Detroit. He worked for the Lincoln Motor Co. as a tool maker and later became a tool designer with the Packard Motor Co.

Before going to the wire products firm, Mr. Beyma was president of the Central States Engineering Corp. in Detroit. Prior to that he headed engineering at the Pioneer Engineering and Mfg. Co. as executive vice president.

Mr. Beyma was a member of the Detroit Engineering Society.

George W. Prouse

George W. Prouse, 37, of Brantford, Ontario, died October 12 in Brantford General Hospital from injuries received two years ago in a midget automobile race. A member of the Hamilton, Ontario, ASTE chapter, he had owned and operated the Eagle Machine & Tool Co. since 1939.

Coming MEETINGS

CHICAGO—December 11, 7:30 p.m., University of Illinois, Navy Pier. Speaker: Lee H. De Wald, engineer with National Cylinder Gas Co., Chicago. Subject: "Cemented Carbides." March 17-21, 1952. American Society of Tool Engineers Industrial Exposition and 20th Annual Meeting.

CLEVELAND—December 15, Rainbow Room, Hotel Carter. Christmas party and scholarship dance. January 11. Plant tour, Yoder Co.

DETROIT—December 13, Christmas party. December 6, Carbide Section, Rackham Building. Subject: "Maintenance—Grinding and Handling."

ERIE—December 4, 6:30 p.m. General Electric Community Center. Subject: "Chrome Plating".

GRAND RIVER VALLEY—December 7, Ladies Night. January 4. Speaker: E. J. Klonowski, Pivot Punch & Die Corp., North Tonawanda, N. Y. Subject: "Pivot Punches, Their Use and Application".

GREATER LANCASTER—December 11, plant tour, Armstrong Cork Co.

LOS ANGELES—December 14, 8 p.m., Deauville Club, Santa Monica. Christmas party and dinner dance.

MADISON—December 11, annual Christmas party.

MID-HUDSON—December 11. Speaker: J. D. Roberson, Instrument Specialties Co., Little Falls, N. J. Subject: "Methods and Techniques Used in Fabrication of Beryllium Copper Springs".

MILWAUKEE—December 14, 6:30 p.m. Plant tour, Bucyrus-Erie Corp.

MUNCIE—December 8, Christmas party. Speaker: Barton R. Pogue. January 8. Speaker: J. R. Koske, Eutectic Welding Alloys Corp. Subject: "Tool and Die Salvage and Design".

NEW HAVEN—December 14, Christmas party. January 10. Speaker: A. C. Sanford, Federal Products, Providence, R. I. Subject: "Automatic Gaging".

ROCHESTER—December 3. Speaker: J. S. Gillespie, Carboloy Dept., General Electric Co., Detroit, Michigan. Subject: "What Every Tool Engineer Should Know Today About Cemented Carbides". January 7. Speaker: K. N. Macomber. Subject: "Latest Developments in Surface Broaching".

SEATTLE—December 11, Christmas party.

TOLEDO—December 12. Program on "Gaging" by the Sheffield Corp., Dayton, Ohio.

TORONTO—December 5. Speaker: Archie Smith, Union Screen Plate Co. of Canada, Ltd. Subject: "Electro Polishing and Plating". January 2. Plant tour, John Inglis Co., Ltd.

TULSA—December 13. Speaker: H. E. Collins, ASTE director from Houston, Texas. Subject: "Behind the Iron Curtain".

Erie Holds Ladies Night

Erie, Pa.—The annual Ladies Night meeting of the Erie chapter was held October 2 at the Sportsman Club near Waterford. The location proved an ideal compromise for out-of-town members traveling from Meadville, Warren and Corry. Thirty-seven couples attended the dinner-dance.

Program speaker was Max E. Darone, general secretary of the Erie YMCA, who spoke on "The Early Pennsylvania Dutch". He described the dress, customs, unusual habits, quaint phrases and community meetings of the early settlers in the state.

Charles Hudson Retires

Worcester member Charles J. Hudson retired in November as quality manager of the Norton Company's Abrasive Division. Known throughout the country for his work in quality control, Mr. Hudson has written many articles and lectures on the subject. He is now a consultant to the company.

Open New Shop in Toledo

Howard Crawford and George Bath, members of the Toledo chapter, are now operating their own process work and tool design shop at 5122 Lewis Ave. They were formerly associated with the Detroit Tool Engineering Co. and at one time worked for the Prestole Corp. of Toledo.

Karl Meyer Manages Reliance Division

Karl H. Meyer, who had been managing the Ashtabula, Ohio, plant of the Reliance Electric & Engineering Co. since 1947, is now in charge of the firm's Ivanhoe Division.

A member of the Cleveland ASTE chapter, he has been with Reliance since 1926 when he graduated from Case Institute of Technology. In a series of promotions, Mr. Meyer became responsible for tooling and methods, works engineering and was made superintendent and later manager of the company's Marine Division.

Launch Drive for New Hampshire Members

Keene, N. H.—The first ASTE meeting ever held in Keene took place October 17 at the Hotel Ellis. A joint project of the Twin States chapter of Springfield, Vt., and a group of Keene tool engineers, the meeting introduced the ASTE program and services to the local engineering profession.

Sixty-two members and prospective members heard a talk on the Society by Floyd J. McArthur, chairman of the Twin States chapter. Armed with his member-getting kit, Mr. McArthur launched the membership drive for a co-chapter in Keene.

The coming technical programs of the parent chapter were outlined by Robert W. Laffin. A pep talk on ASTE was given by George Julian. Edward J. Kingsbury, Jr., pointed up the value of the tool engineer to industry.

J. L. Whitmore, sales engineer for the Carboloy Dept. of General Electric Co., as principal speaker of the evening, opened his talk with a movie, "Everyday Miracles", which illustrated the role carbide plays in modern living.

Mr. Whitmore told of cutting speeds for tungsten carbide cutting tools of 20,000 fpm, but said modern machine tools are still not large enough or strong enough to enable manufacturers to make full use of carbides. He stated that there are ranges of speeds where tungsten carbide does not do a good job, but that the higher the speed, the longer the tool life and better the finish.

James N. McHoul of Kingsbury Machine Tool Corp. was chairman for this first meeting, assisted by Howard Yon, Arthur H. Knight, Dennis Brennan, Joseph Frigon, Glenn Naromore, Harvey Gasear, Maurice Towne, Mel Perkins, and Chester Werme.

Shows Cedar Rapids Frozen Food Packaging

Cedar Rapids, Iowa—Gene Fries, assistant to the plant manager at Cry-O-Wrap Division of Demey and Almy Chemical Co., spoke at the October 17 Society meeting held at the Hotel Montrose.

After listing the reasons for establishing the plant in Cedar Rapids, he described the process of converting a powdered chemical to a plastic material, extruding the plastic to form a tube, printing, cutting, forming and sealing the tube to form the individual bags for packaging frozen foods.

The technical program was presented by M. J. Mikulak, sales manager for the Dayton Rogers Mfg. Co. of Minneapolis, Minn. "Low Production and Temporary Dies" was his subject.

Pictured at the New England regional meeting on coordinating educational activities of individual chapters are: (back row, from left) Harry Hauck, Arthur R. Diamond, member of the national educational committee; Prof. Jay N. Edmondson, national education chairman; J. J. Demuth, ASTE president; Edward J. Ross, Hartford education chairman; Joseph P. Crosby, Society director; Irwin F. Holland and Clarence W. Christiansen, Boston education chairman. Seated are: Prof. Prescott A. Smith, Boston chairman; Richard A. Smith; Walter B. Fasser; Edmond Morancey; Cornelius M. Woog; Ralph A. Baker, Worcester chairman; and William T. Allison. The meeting was held in Hartford, Conn.

Chicago Members Learn Operation of Air Motor

Chicago, Ill.—Reports on the 1952 ASTE Industrial Exposition and activities at the first tool engineering conference held at the University of Illinois made up the business agenda at the Chicago chapter meeting on October 9.

The technical program on "Controlled Air Power" was presented by James J. Mudd, midwest manager of the Bellows Co. in Akron, Ohio. He was assisted by L. A. Boese, Chicago district manager.

Explaining the differences between the plain air cylinder and the Bellows air motor, Mr. Mudd described the double-acting cylinder of the Bellows motor, with its intake and exhaust valve and speed control built right into the cylinder. To achieve consistent speed such as that required to obtain even feed on machine tools, hydro-check is used.

Mr. Mudd, after his short introduction, showed films prepared by Bellows illustrating the many applications of controlled air power.

Diagrams of the company's products were also shown to Chicago ASTE members, who later participated in a question and answer period.

Dinner at the faculty dining room at the University of Illinois, Navy Pier, preceded the meeting.

Other News in This Issue

Directory of A.S.T.E. Chapter Chairmen

AKRON, C-47
Third Monday*
A. O. Hunt, 124 N. Harmony St., Medina, O.

ALBUQUERQUE, C-93
First Friday*
Jerome F. Durrie
3350 48th Loop
Sandia Base, Albuquerque, N.M.

ATLANTA, C-61
Third Monday*
Clarence E. Redfern, Auto Soler Co., 267 Marietta St., N.W., Atlanta 3, Ga.

BALTIMORE, C-13
First Wednesday*
John W. Schukraft, 1213 E. Belvedere, Baltimore 12, Md.

BINGHAMTON, C-35
Second Wednesday*
Donald L. Ellis, 97 Front St., Vestal, N.Y.

BOSTON, C-33
Second Thursday*
Prescott A. Smith, Mass. Inst. of Tech., 77 Massachusetts, Cambridge 39, Mass.

BUFFALO-NIAGARA FRONTIER, C-10
Second Wednesday*
Wilbur J. Reich, 1036 Town Line Rd., Lancaster, N.Y.

CEDAR RAPIDS, C-71
Third Wednesday*
W. D. Popek, 84 Wilson Ave., S.W. Cedar Rapids, Ia.

CENTRAL PENNSYLVANIA, C-22
First Monday*
David A. Schrom, 554 Pacific Ave., York, Pa.

CHICAGO, C-5
Second Tuesday*
Harold D. Long, 1901 S. Rockwell, Chicago 8, Ill.

CINCINNATI, C-21
Second Tuesday*
Edgar L. Routzong, 6131 Robison Rd., Cincinnati 13, O.

CLEVELAND, C-3
Second Friday*
R. C. Southwell, 2025 Belvoir Blvd., Cleveland 12, O.

COLUMBUS, C-36
Second Wednesday*
Milner D. Sherman, 2745 Camden Rd., Columbus 12, O.

DAYTON, C-18
Second Monday*
Lawrence R. McAfee, Peninsular Steel Co., 401 Kiser St., Dayton 4, O.

DECATUR, C-58
Last Tuesday*
James H. Clark, 1090 W. Tuttle, Decatur, Ill.

DENVER, C-77
First Wednesday*
Warren L. Foss, 930 S. Elizabeth, Denver 9, Colo.

DES MOINES, C-80
Third Wednesday*
Clyde Allen, 836 Douglas, Des Moines 13, Ia.

DETROIT, C-1
Second Thursday*
John D. Anderson, 13860 Fairmount Dr., Detroit 5, Mich.

ELMIRA, C-24
First Monday*
Henry G. Lemaire, RD 1, River Rd., Elmira, N.Y.

ERIE, C-62
First Tuesday*
Robert J. Wilson, Jr., 10 Henry St., Warren, Pa.

EVANSVILLE, C-73
Second Monday*
Charles H. Thuman, Seeger Refrigerator Co., 225 W. Morgan Ave., Evansville 7, Ind.

FAIRFIELD COUNTY, C-6
First Wednesday*
Douglas F. Linsley, 250 S. Compo Rd., Westport, Conn.

FOND DU LAC, C-45
Second Friday*
Charles Billberg, Wisc. Axle Div., 567 High St., Oshkosh, Wis.

FORT WAYNE, C-56
Second Wednesday*
Ralph J. Didier, 2501 Wayne Trace, Ft. Wayne 4, Ind.

FOX RIVER VALLEY, C-72
First Tuesday*
George Bodi, 519 Edwards St., Aurora, Ill.

GOLDEN GATE, C-28
Third Wednesday*
G. B. Berlien, Ind. Steel Treating, 600 Fallon St., Oakland, Calif.

GRAND RIVER VALLEY, C-81
First Friday*
Harry J. Sehl, Sehl Eng'g. Co., Kitchener, Ont., Can.

GRANITE STATE, C-86
Second Tuesday*
Charles M. Nystedt, 24 Meadow Rd., Durham, N.H.

HAMILTON, C-42
Second Friday*
J. E. R. Yorick, 105 Sterling St., Hamilton, Ont., Can.

HARTFORD, C-7
First Monday*
R. M. Toppin, Jacobs Mfg. Co., W. Hartford, Conn.

HOUSTON, C-29
Second Tuesday*
Robert E. Schuller, 7024 Avenue N., Houston 11, Texas

INDIANAPOLIS, C-37
First Thursday*
Ernest W. Hilkenbach, 722 Fairfield Ave., Indianapolis, Ind.

JACKSON, C-87
Last Tuesday*
Frank E. Gokay, 334 Hibbard, Jackson, Mich.

KANSAS CITY, C-57
First Wednesday*
Ivan J. Nelson, 2239 Garfield Ave., Kansas City 2, Kans.

LANCASTER, GREATER, C-89
Joseph H. Resser, Sr.
Neffsville, Pa.

LEHIGH VALLEY, C-83
Third Friday*
James R. Fairhurst, 91 Harte, Phillipsburg, N.J.

LITTLE RHODY, C-53
First Thursday*
C. B. George, 276 Niantic Ave., Providence 7, R.I.

LONDON-ST. THOMAS and DISTRICT, C-91
Albert H. Ward, 560 South St. Apt 3, London, Ont., Can.

LONG BEACH, C-84
Second Wednesday*
William B. MacKay, 260½ Glendora Ave., Long Beach 3, Calif.

LONG ISLAND, C-88
Henry Maehl, Fairchild Engine Div., Fairchild Engine & Airplane Corp., Farmingdale, L.I., N.Y.

LOS ALAMOS, C-92
First Thursday after First Wednesday*
Joseph A. Parks, 2218-B 37th St., Los Alamos, N.M.

LOS ANGELES, C-27
Second Thursday*
G. J. Walkey, 1524 Pepper St., Burbank, Calif.

LOUISVILLE, C-54
Second Wednesday*
W. D. Wuest, 916 Greenleaf Rd., Louisville 13, Ky.

MADISON, C-75
Second Tuesday*
A. G. Hoffer, Gisholt Mach. Co., 1245 E. Washington, Madison 10, Wis.

MID-HUDSON, C-74
Second Tuesday*
William W. Schug, 8 Janis St., R.D. 2, Hudson, N.Y.

MILWAUKEE, C-4
Second Thursday*
Walter O. Behrend, 2817 N. 48th St., Milwaukee 10, Wis.

MOHAWK VALLEY, C-78
Fourth Tuesday
Arnold K. Schroeder, 2810 Leibel Pl., Utica 3, N.Y.

MONTREAL, C-50
Second Thursday*
J. P. Cloutier, 5035 Ontario E., Montreal, Que., Can.

MUNCIE, C-70
First Tuesday*
H. L. Mendenhall, N. Tillotson Ave., RFD 7, Muncie, Ind.

NASHVILLE, C-43
Third Tuesday*
A. Scobey Rogers, Jr., 2808 Westwood Ave., Nashville, Tenn.

NEW HAVEN, C-41
Second Thursday*
David J. Mathewson, Mathewson Tool Co., 28 Richards St., West Haven, Conn.

NEW YORK, GREATER, C-34
First Monday*
Edward Galvin 22 Forest Ave., Hastings-on-Hudson, N. Y.

NIAGARA DISTRICT, C-65
First Thursday*
F. W. Dunn, 366 Church Rd., RR 5, St. Catharines, Ont., Can.

NORTH TEXAS, C-51
Last Friday*
John K. Turvene, 3003 Aster St., Dallas 11, Texas

NORTHERN NEW JERSEY, C-14
Second Tuesday*
James Allan, 285 Munroe Ave., Wyckoff, N.J.

PEORIA, C-31
First Tuesday*
Duane H. Brighton, 125 S. Eleanor, Peoria, Ill.

PHILADELPHIA, C-15
Third Thursday*
Willard J. Griffith, Rittenhouse Rd., Fairview Village, Pa.

PIEDMONT, C-82
Second Monday*
A. F. Moosbrugger, 14 F College Village, Winston Salem 5, N.C.

PITTSBURGH, C-8
First Friday*
W. J. Bickmore, 3942 Forbes St., Pittsburgh, Pa.

PONTIAC, C-69
Third Thursday*
John M. Fritcher, 933 Cameron Ave., Pontiac 17, Mich.

PORTLAND (ME.), C-46
Second Friday*
Carl A. Snow, 10 Hastings, Portland 5, Me.

PORTLAND (ORE.), C-63
Third Thursday*
Walter L. Brenneke, 2434 N. E. 21st Ave., Portland 12, Ore.

POTOMAC, C-48
1st Thurs. after 1st Mon.*
B. E. Thomasson, 4900 13th St., N., Arlington, Va.

RACINE, C-2
First Monday*
George S. Strombeck, Racine School of Voc. Adult Educ., 800 Center St., Racine, Wis.

RICHMOND, C-66
Second Tuesday*
Dezell Gibbs, Perfect Circle Corp., 522 S. Washington, Hagerstown, Ind.

ROCHESTER, C-16
First Monday*
James O. Horne, James O. Horne Co., 212 Powers Bldg., Rochester 14, N.Y.

ROCKFORD, C-12
First Wednesday*
George P. Torrence, Jr., Ingersoll Milling Mach. Co., Rockford, Ill.

SAGINAW VALLEY, C-68
Third Thursday*
Russell M. Ayers, 3410 Gratiot, Flint 3, Mich.

ST. LOUIS, C-17
First Thursday*
L. W. Greenblatt, Jr., 7814 Maplewood Ind. Ct., St. Louis 17, Mo.

SALT LAKE CITY, C-85
1st Fri. after 1st Wed.*
Leslie C. Seager, 1194 Crystal Ave., Salt Lake City 6, Utah

SAN DIEGO, C-44
Second Tuesday*
A. P. Manino, 4816 Federal Blvd., San Diego 2, Calif.

SCHENECTADY, C-20
Second Thursday*
Benjamin E. Storrs, 37 Wallace St., Scotia 2, N.Y.

SEATTLE, C-39
Fourth Tuesday*
Francis L. Coenen, 7756 Mission Dr., Seattle 88, Wash.

SOUTH BEND, C-30
Second Tuesday*
H. A. Goltz, 1206 Portage Ave., South Bend, Ind.

SPRINGFIELD (ILL.), C-64
First Tuesday*
Roger W. Wallace, 1930 N. 6th St., Springfield, Ill.

SPRINGFIELD (OHIO), C-76
Fourth Thursday*
Eldon M. Neff, 1515 Maryland Ave., Springfield 20, O.

SPRINGFIELD (MASS.), C-32
Second Monday*
Jason G. Doubleday, North Rd., Hampden, Mass.

SYRACUSE, C-19
Second Tuesday*
Carl J. Hoffman, 21 Reed Parkway, Marcellus, N.Y.

TOLEDO, C-9
Second Wednesday*
Dale H. Burke, 4238 N. Lockwood Ave., Toledo 12, O.

TORONTO, C-26
First Wednesday*
Douglas R. Cooper, Can. Fairbanks Morse Co., 137 Harbour St., Toronto, Ont., Can.

TRI-CITIES, C-23
Second Wednesday*
Joseph Zelnio, 421 11th St., Moline, Ill.

TULSA, C-90
Second Thursday*
Louis H. Trainor, 1248 S. Pittsburg, Tulsa 12, Okla.

TWIN CITIES, C-11
First Wednesday*
Peter S. Tobias, 4451 5th St., N.E., Minneapolis, Minn.

TWIN STATES, C-40
Second Wednesday*
Floyd J. McArthur, 2 Circular St., Springfield, Vt.

WATERLOO AREA, C-79
Last Wednesday*
James A. McCollum, 2015 Highland Dr., Ann Arbor, Mich.

WESTERN MICHIGAN, C-38
Second Monday*
Claude C. Hanish, 420 Elliott S.E., Grand Rapids 7, Mich.

WICHITA, C-52
Second Wednesday*
Hazen I. Dool, 847 Marcilene, Wichita 17, Kans.

WILLIAMSPORT, C-49
Second Monday*
Richard S. Huskin, 808 Lincoln Ave., Williamsport 31, Pa.

WINDSOR, C-55
Second Monday*
H. J. A. Chambers, Std. Mach. & Tool Co., 870 Ottawa St., Windsor, Ont., Can.

WORCESTER, C-25
First Tuesday*
Ralph A. Baker, Whitin Machine Wks., Whitinsville, Mass.

*Meeting Night

News in Metalworking . . .

FEDERAL CHARTER STATUS SOUGHT FOR ASA

"In order to remove the block that now impedes fruitful cooperation in standards work between government and industry," Thomas D. Jolly, vice president of the Aluminum Company of America, called for federal charter status for the American Standards Association in his address before the recent National Standardization Conference. Mr. Jolly is the retiring president of the Association.

The effectiveness of any army today depends on the production machine behind it, according to the speaker, and the effectiveness of the production machine depends on the techniques of standardization. These include such "basic engineering techniques as continuous straight line assembly, maximum use of standard components and minimum changes in type". Perhaps we could "muddle along" in normal times without proper cooperation between government and industry in standards work, he stated, but in the present crisis it is dangerous and we cannot afford to waste vast amounts of materials and resources, dollars and man hours through lack of a unified comprehensive system of standards.

Mr. Jolly pointed out that when ASA was incorporated in 1948, government agencies withdrew from membership. They now participate in ASA work on a liaison basis. Standardization has lost considerably through this move, he announced, going on to describe his organization as "the logical place where government and industry can meet in standards work as partners on common, equal grounds".

Latest information, according to the speaker, indicates that "Russia has the largest standardization body in the world, staffed with some 200 engineers and technicians, turning out compulsory standards at the rate of two a day."

FORM SERVICE FIRM

The Production Service Company recently was formed by E. B. Rhodes and Henry Bothe. Both men previously were associated with Bendix Westinghouse Automotive Air Brake Company. The firm, located at 15017 Detroit Ave., Cleveland, represents Hanson-Whitney and Engineers Specialties Div. of Buffalo.

LINCOLN ELECTRIC MOVES

Company headquarters for the Lincoln Electric Co., Cleveland, have been moved to the company's recently completed plant at 22801 St. Clair Ave.

BRITISH METALWORKING TEAM STUDIES U.S. TOOL INDUSTRY

Due to the necessity to increase production in spite of probable reduced manpower, fifteen specialists from the British metalworking machine tool industry have been on a five-week tour of this country, studying methods used by U. S. industry to attain the high production rate here.

Prime objective of the team of experts was to determine what methods and ideas developed by American machine tool manufacturers could be used in Britain to increase productivity or output per man-hour. The study took in such specific factors as types, sizes and average output of products; plant layouts and handling methods; production and cost controls; designs and methods for production, and company organization.

ADVANCE RESEARCH IN STEEL FIELD

The metallurgical research program is being intensified in the specialty and stainless steel fields on the part of steel companies as well as in company-sponsored laboratories in schools according to the Committee of Stainless Steel Producers of the American Iron and Steel Institute.

Purpose of the increased study is said to be two-fold—to make available as much stainless and high alloy steel as possible to essential defense purposes; and to assure supplies of stainless for important civilian purposes.

Research engineers are seeking solutions to metallurgical problems arising from high-temperature applications, such as those in jet engines, and from extreme corrosive conditions. At the same time, they are working to develop a stainless and other high alloy steels employing less alloy materials than those now commonly used, yet possessed of equal or even better serviceability and fabrication qualities. At present three of the primary alloying elements used in the production of steels—chromium, nickel and columbium—are imported by the United States.

HEALD MACHINE CELEBRATES 125TH YEAR

The Heald Machine Company has this year celebrated its 125th anniversary of continuous operation. During that period, the firm has been under the management of a single family beginning with its founder, Stephen Heald, great grandfather of Roger, Richard and Robert Heald, the present management.

Early products of the firm—whose first ledger entry reads "To turning nine hundred chair rods...1.50"—included such items as cheese presses and corn cob crackers. Growth later swung more to agricultural implements enlarging to foundry and machinery items and finally developing to the present-day industrial giant manufacturing precision finishing equipment.

BESLEY BUILDS ADDITION

A modern one-story plant is being built by Charles H. Besly and Co. which will house both machine and cutting tool divisions of the firm.

Improved materials flow, and additional tools and handling equipment is expected to result in a possible 100-percent increase in productivity for the company.

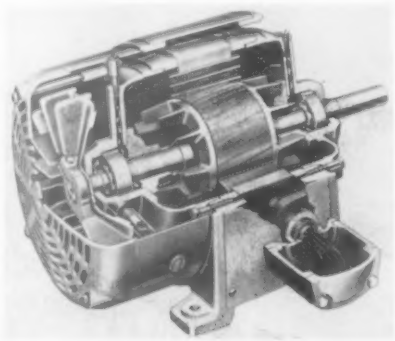
OPEN ENGINEERING OFFICE

Henry D. Fowlie & Associates, made up principally of professional engineers experienced in tool design, has been opened recently at 1216 West Catalpa Dr., Royal Oak, Michigan. The organization specializes in processing tools, dies and special machine design.

Tools of Today . . . .

Explosion-Proof Motor

A totally-enclosed motor for explosion-proof requirements has been developed by U. S. Motors. Made in capacities from 3 to 75 hp, this motor, types SE and SES, carries the Underwriter's label in Class 1, Group D, for highly inflammable gases and volatile liquids, and in Class 11, Groups F and G, for combustible dusts. Other types SD and SS, without label, for non-explosion-proof services, are also available. Features incorporated include:



sealed terminal, elongated spark-arresting bearing sleeves, streamlined housing, hi-draft ventilation, removable cover, split hub fan, normalized castings, Lubriflush bearings, asbestos-protected winding, and solid, centricast rotor. Being completely sealed, this motor gives protection against external hazards, preventing intrusion of abrasives, acids, moisture and other deleterious substances. Bulletin No. 1629 may be obtained by writing U. S. Electrical Motors, Inc., 200 East Slauson Avenue, Los Angeles 54, Calif.

T-12-791

Crankshaft Micrometer

A new micrometer manufactured by The L. S. Starrett Co., Athol, Mass., is designed especially for crankshaft measuring. It handles most crankshaft diameters since the micrometer has a 3-in. frame with a range from 1½ to 2½ in.

The reading point, the longitudinal line on the sleeve, is on the under side of the thimble, plainly visible while measuring. This feature provides easy measuring between webs. The anvil and spindle lengths are also specially designed for crankshaft measurements.

The frame is finished in smooth black enamel and is easily cleaned. The thimble is stamped with convenient decimal equivalents. A rust-resistant no-glare satin chrome finish on sleeve and thimble make markings stand out sharp and clear under any illumination. The spindle has a one-piece construction with threads hardened, stabilized and ground from the solid. Anvil and spindle faces also have a Hi-Micro mirror-like finish for lasting precision. Furnished with ratchet stop and lock nut. Also available in metric. **T-12-792**

Down-Coiler Motor

A heavy-duty, mill-type, flange-mounted down-coiler motor, designed to operate under some of the most severe conditions in steel mill practice, is available from Westinghouse Electric Corporation.

The motor is equipped with a heavily-reinforced flange mounting; heavy-duty, double-row ball bearings; and heavy, cast-brass mill-type brushholders. It is of totally-enclosed construction, with leads brought out through packing glands and protected by heavy hose.

Armature construction uses slot wedges of class B material instead of bands, and windings with class B insulation for protection against hot spots resulting from high peak currents. The armature also has low inertia for rapid acceleration and deceleration. A bolted-type commutator assembled on a steel bushing is used for long life and ease of maintenance.

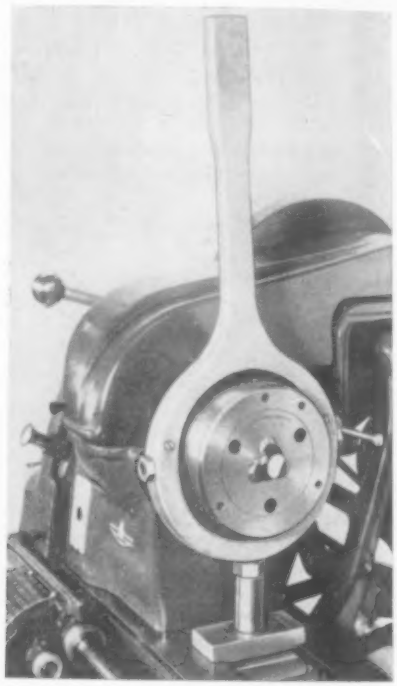
The relatively small diameter of this motor requires minimum mounting space. Flanges can be provided for mounting on any type of down-coiler.

For further information, write Westinghouse Electric Corporation, Box 2099, Pittsburgh 30, Pa. **T-12-801**

Speed Chuck

This Standard Hampton speed chuck has a wide capacity range, handles all shapes of stock with the same jaws and permits individual jaw adjustment for zeroing run-out, or compensating for wear as it occurs.

The three jaws close universally, yet each is capable of individual adjustment over its full capacity range. This not only permits exact zeroing adjustments but accommodates eccentric chucking and accurate centering of square stock —with only 3 jaws.



Round work can be gripped or released without stopping the chuck on lathe applications. Chucking is accurate and will repeat to a matter of "tenths." Other applications include use on milling machines and drill presses and all other places where repetitive chucking is essential.

The Standard Hampton speed chuck is simple in construction. Jaws are closed by a sliding sleeve which is drilled and tapped for three equally spaced adjusting screws. Each screw end contacts the top surface of one jaw, which is tapered from front to back. As the sleeve slides forward, each jaw is forced inward an amount equal to the taper, or approximately 1/64 in. total. Jaws are individually zeroed or set for eccentric work by raising or lowering the adjusting screw.

Further information is available from Wallace Pawley Enterprises, 990 E. Slauson Avenue, Los Angeles 11, Calif.

T-12-802

USE READER SERVICE CARD ON PAGE 97 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Comparator Lens

The Jones & Lamson Machine Co. has recently perfected a 5 magnification projection lens with a 6-in. aperture and a 12-in. focal clearance, for their Optical Comparators.

With this lens, according to company report, the contour of any object which will fall within a 6-in. circle can be projected in its entirety onto the 30-in. receiving screen for measurement or direct comparison, with high accuracy and sharpness of outline.

The large aperture provided by this lens now permits direct over-all inspection of a wide variety of relatively large objects. Typical applications include the inspection of cams, templates, air foil sections, and cutters.

T-12-811

Single-Post Drill Jig

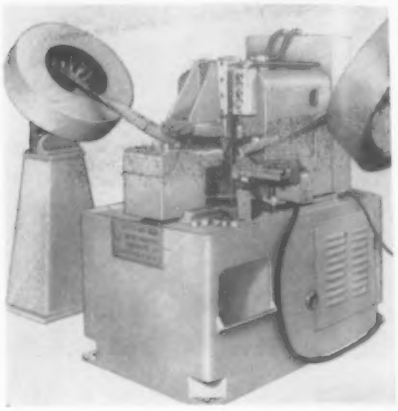
A single-post drill jig, combining small-size economy with accurate alignment and "touch-release" locking, is offered by Esco Engineering Corp., 1940 E. Woodbridge, Detroit 7. Called the Esco Mijit B-6, it is recommended for drilling small parts and for short and medium size runs where more costly fixtures and tooling cannot be justified. Salvage is upwards of 60 percent by changing adapters and bushing plates, supplied from stock by the manufacturer.

Like other jigs in the Mijit line, the Esco B-6 provides an infinite number of locking positions, due to its patented cam action. This feature is said to cut loading and unloading time to seconds. Locking is positive and requires no pressure, yet releases instantly with a slight lift of the locking handle.

Base and top plate are accurately machined, as is the right angle of back to base for optional use in a side or lying-down position. Accurate alignment between bushing plate and base is maintained by means of a hardened and ground post and alignment dowel. The post also serves as raising and lowering rack, with a one-inch stroke. **T-12-812**

Cam Automatic Offered

The Motch & Merryweather Machinery Co., 715 Penton Building, Cleveland 13, Ohio, has added a second model to its line of cam automatic forming machines. The underlying principle is that all machine functions are mechanically controlled by one main camshaft.



The model illustrated turns the OD and chamfers one end of laminated silicon steel motor rotors. Varied lengths of any one diameter can be handled.

These cam automatics can be furnished with hopper or magazine feed. Where long pieces are to be formed and cut off, a hydraulically operated bar feed can be included. The main camshaft in all automatics has its own drive motor, as has each of the two spindles. **T-12-821**

Rust Proofing Method

An economical method of preventing rust and corrosion of metal parts, in the presence of air and moisture, is provided by "VPI" crystals, a slightly volatile amine nitrite made by the Shell Oil Company, 50 West 50th Street, New York 20, N. Y. This volatile corrosion inhibitor is now used in protecting metal parts, assemblies, instruments and finished products during shipment, storage and through various processing steps.

Slightly volatile at atmospheric temperatures, VPI gives off vapors which are carried by convection and diffusion to all surfaces of the metal, where they condense to provide a thin protective layer.

Metal parts protected by VPI are ready for instant use since there is no grease or oil to remove. Relatively small quantities of VPI are required to give adequate protection. Two types of VPI are available; VPI 220, which has greater vapor pressure but less stability at higher temperatures than VPI 260, which is more widely used by industry.

Complete details may be obtained from the company. **T-12-822**

Vertical Miller

Designed to handle accurate work, a vertical milling machine featuring rigidity, flexibility and a wide range of operation has been introduced by the Johansson and Windle Company, 6015 Dahlin Drive, Skokie, Illinois. All feed screws are precision-ground and mounted in pre-loaded ball bearings. Dials are unusually large—3-3/16 in. in diameter and graduated into 100 increments.

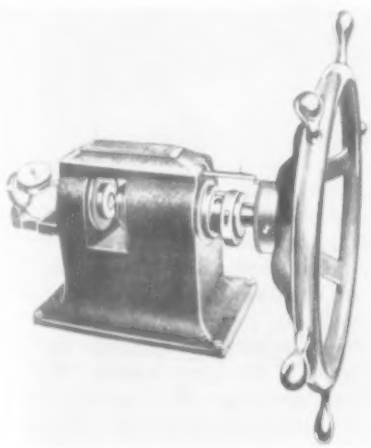
Dials are plated with a satin finish, and all other parts subject to corrosion or tarnish are either plated or black-oxided.

The machine includes a milling unit which provides spindle speeds (with a 1725-rpm motor) of 180 to 1,000; 350 to 1,900; and 600 to 3,250 rpm. Quill travel is 2-1/16 in. A handle and wheel feed are provided for drilling and boring operations. Additional features include a positive quill lock and micrometer depth stop graduated in thousandths of an inch. A No. 7 B & S or No. 2 Morse taper spindle is optional.

Specifications of the Johansson vertical milling machine are: longitudinal feed, 12 in.; cross feed, 4¼ in.; vertical feed of knee, 12 in.; maximum distance, spindle to table, 12 in.; minimum distance spindle to table, 0 in.; maximum distance spindle to column, 8¾ in.; size of table, 6 x 18 in.; approximate weight of machine, 600 lb; height, 60 in.; approximate floor area required, 35 x 38 in. **T-12-831**

Sheet Metal Tester

J. Arthur Deakin & Son, 150-28 Hillside Ave., Jamaica 2, N. Y., national representatives for George H. Alexander Machinery, Ltd., are introducing Alexander's Sheet Metal Tester for making the Erichsen Test.



The test determines the actual "workability" of ferrous, non-ferrous and fine metal sheets and strips to the point of fracture. This tester will handle material up to 5/64 in. thick. This method of test provides an effective means for material control between suppliers and users. Specifications for quality of sheets or strips can be established by agreeing on certain minimum "standard values."

A test piece is clamped between two dies and is held so that the metal has "play" and can flow, while a perfect round-end tool is moved forward gradually by the hand wheel until fracture occurs. The operator constantly observes the image of the test piece in a mirror, and when fracture appears, the depth of the impression is read directly from a micrometer scale. Readings can be obtained accurately to 0.0004 in. The depth of impression required to obtain fracture represents the "standard value," which is the basis of workability of metal sheets for manufacturing purposes.

Test pieces of 3½ in. square and sheets or strips up to 2-7/16 in. wide can be tested with standard tools. Additional interchangeable tools can be supplied for checking narrow strips up to 25/64, ¾ and 1 in. wide, for coin blanks and to determine the "deep drawing value" of materials. **T-12-832**

Stabilization of Steel

Complete dimensional stabilization of steel, ordinarily requiring years of seasoning, is now being effected in a matter of hours by chilling to 120 deg F in Sub-Zero industrial chilling machines, manufactured by Sub-Zero Products Division, Deepfreeze Distributing Corporation, Cincinnati 29, Ohio.

In ordinary heating and quenching of steel not all the austenite is transformed to martensite. This unchanged portion causes dimensional growth and warp over a period of time. However, it has been found that repeated cycles of heating to room temperature and chilling to —120 deg F brings about 100-percent transformation of austenite to martensite. As a result of this change complete stabilization is obtained.

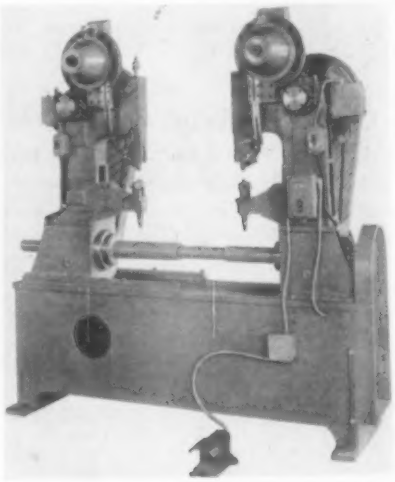
At the same time greater hardness, strength and ductility is obtained, according to the manufacturer's reports.

Further details on the use of Sub-Zero chilling in steel stabilization are available from the manufacturer.

T-12-841

Dual Rivitor

A "Dual Rivitor," designed to save time and labor in assembly and riveting, has been furnished to Allis-Chalmers Mfg. Co. by the Tomkins-Johnson Co., Jackson, Mich. It is

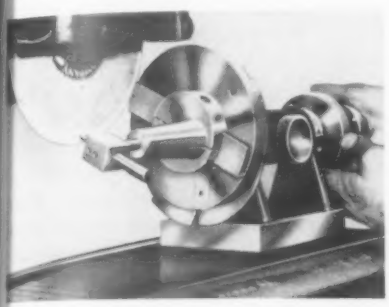


equipped with 10-in. hoppers, and tooled to automatically feed and set two ¼ in. dia. x ⅝ in. long wagon box head rivets at a time in elevator chain and raddle assemblies for farm implements.

This machine consists of two 8-in. Model "R" Rivitors, mounted face to face on a common base, adjustable for rivet spacings ranging from 2½ in. to 18 in., center to center. One motor drives both flywheels, which are synchronized by a combination gear and chain drive arrangement. Both clutches are tripped by solenoids, connected to a single foot switch. **T-12-842**

Wheel Dresser

The Last Word Wheel Dresser is a compact, rugged and precision-built unit which, when mounted on a magnetic chuck, can accurately dress any radius, concave or convex, with angles tangent to radius. It likewise can be used for plain radius or angle-dressing or any combination.



Set-up of the diamond head is rapid and simple. Angle stops are incorporated for accurate control of relationship of radius and tangent.

Two additional advantages of the Last Word Dresser are that it does not require center-mounted diamonds and it permits dressing below the wheel and use of guard and dust collector.

For further information, write to Last Word Sales Co., 18500 Mt. Elliott Avenue, Detroit 34, Michigan. **T-12-851**

Electric Etcher

Tools, gages, parts for automobiles, aircraft, engines, and machinery—as well as cutlery and other consumer merchandise—can now be marked rapidly, economically, and uniformly with the Taylor-Hobson "Javelin" Etcher.

This machine handles up to 15 workpieces at one time, etching on hard or soft metals—flat or curved surfaces—with identifying numbers, names, trademarks or designs.

The marking is produced by means of a series of minute electric arcs, formed at the point of a rapidly vibrating electrode linked to a pantagraph. The pantagraph, which controls the fifteen "javelins," is guided in specially prepared intaglio "copy," by a single operator, without previous skill or training.

The "Javelin" method offers maximum flexibility for shape and size of workpiece—for design and depth of mark. A piece may be etched in its finished state without prior or after-treatment. The work is clean, safe, accurate, leaves no burrs, and will not damage or weaken the product. Production is faster and cost is lower than conventional marking or acid etching.

Complete description and specifications of the "Javelin" Etcher are available from Engis Equipment Company, 431 South Dearborn St., Chicago.

T-12-852

Die Steel Bars

Simonds "Red Streak" flat ground die steel is now available in 36 in. bars in 35 standard stock sizes from ½ x 2 in. up to 1½ x 10 in. These sizes are in addition to the regular 18 in. bars furnished in 159 stock sizes. The longer bars are slightly over 36 in. in length to allow for several saw cuts.

Made of oil-hardening, non-deforming type die steel (chemical analysis: C 0.85-0.95, Mn 1.30-1.50, Si 0.20-0.35, Mo 0.20-0.30) this multipurose die steel has many features. Uniformly annealed, it is easy to saw, file and machine. Accurately ground to a thickness limit of plus or minus 0.001 in., all bars have an extra smooth finish.

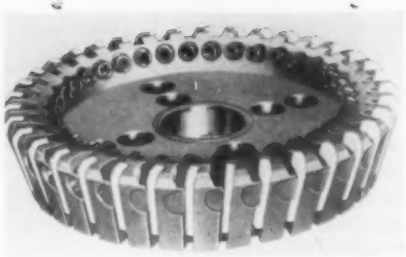
Due to its wide hardening range (1450 deg to 1540 deg F) consistently uniform results with all thicknesses with a minimum of shrinkage or warping is assured with even the simplest heat-treating equipment. Hardening instructions are included on the wrapper of each bar.

A complete list of standard stock sizes may be had on request to Simonds Saw and Steel Co., Dept. A, 470 Main Street, Fitchburg, Mass. **T-12-853**

Kennametal Cutter

Kennametal Inc., has introduced a simplified axial face mill, style MF Kennamill, having wedged-in solid Kennametal blades and structural features that make possible removal of cast iron at from 60 to 70 inches of table travel per minute. It is suitable for both general purpose and high continuous production milling.

This mill has only four parts: body, blades, wedges and nuts. Wedges and screws are one-piece high alloy steel, hardened and ground to close tolerances; they remain assembled to the cutter body at all times, thus reducing the possibility of "lost" parts.



The blades, which are the same as those used in previous design of cast iron cutters, are heavy, solid, wedged-in—thus no brazing strains. No hammers or special tools are needed to tighten them—a simple hex wrench suffices—thus breakage and wedge distortion are minimized. Blades are available in two styles for cutting to a square shoulder or to a 45-deg corner. They are interchangeable in all slots of any size of cutter body of the same type. Wedges are round and are interchangeable in any slot of any size cutter, either right- or left-hand.

The Style MF Kennamill is made in seven cutting diameters: 6, 8, 10, 12, 14, 16 and 18 in.; either right- or left-hand. Specifications and prices are available in Catalog 51 which can be obtained from the manufacturer.

T-12-861

Laboratory Hot Plate

A heavy-duty laboratory hot plate with graduated heat control has been added to the Chromalox line of electric heating equipment. Its new Chromatrol control switch permits infinite variability of the first 50 percent of total wattage of the unit, making it possible to maintain continuously the desired temperature of liquids or other materials.

By selecting from models rated between 660 and 2000 watts, any desired surface temperature up to approximately 800 deg F can be secured and maintained according to laboratory requirements. Hot plates can also be operated at full capacity when higher surface temperature is preferred to precise control. The plates operate on 120 or 240 volts a-c.

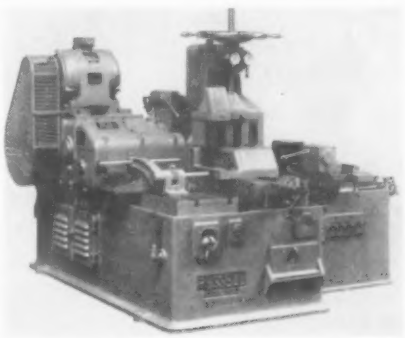
Design of the hot plate incorporates the safety of totally enclosed resistor wires and coolness of handling provided by baffle plates and molded plastic feet. For more information write to Edwin L. Wiegand Co., 7556 Thomas Blvd., Pittsburgh 8, Pa. **T-12-862**

USE READER SERVICE CARD ON PAGE 97 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Cold Sawing Machine

The Triplex Machine Tool Corp., 75 West St., N. Y. 6, is the U. S. agent for the Russell automatic high-speed Cold Sawing Machine which uses saw blades of 22, 24, 26 or 28 in. diameters.

The sawing machine is manufactured by S. Russell and Sons, Ltd., Leicester, England, and is now in stock in New York. These machines are designed for use in works where quantities of material are required to be cut accurately to uniform lengths. The automatic cycle of operations is hydraulically controlled to ensure the correct sequence of each working operation.



Further information concerning this equipment can be secured from the agent. **T-12-871**

HSS Drill Rod

Ace Drill Corp., Adrian, Mich., is introducing hardened and ground high-speed-steel drill rod in standard 36-in. lengths. These blanks have the equivalent toughness of conventional tool steel materials yet measure approximately 6 points higher on the Rockwell "C" scale.

To achieve the ideal combination of toughness, hardness and strength, ten-foot lengths of solid round bar stock are fed through a long, continuous heat-treating furnace. The perfectly regulated movement and constant temperatures combine to produce a hardness as uniform as the steel itself.

Blanks are cut from this treated stock and then are centerless ground. These blanks are available as hardened, tempered and centerless ground in diameters from 3/32 in. to 1 in., with a diameter tolerance of plus or minus 0.001 in., or as hardened and tempered only in sizes from 0.118 in. to 0.515 in.

The combination of toughness, hardness and strength makes it suitable for punches, knock-out pins, dowel pins, rollers, plug gages, tool bits, etc.
T-12-872

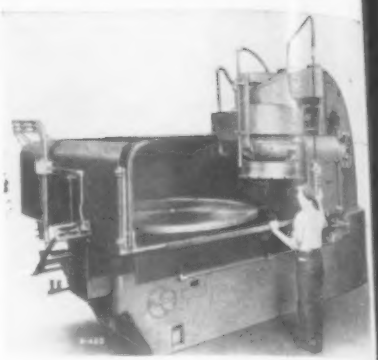
USE READER SERVICE CARD ON PAGE 97 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Filter for Air Lines

A compressed air line filter which functions also as a condenser, due to its extra size and extended surface, is announced by Air-Line Engineering Co., 4758 Warner Rd., Cleveland, Ohio. Called the Airlenco Condensing Filter, this device offers a new approach to the problem of removing water and oil from air lines. It has a steel outer shell 6 in. in diameter and 36 in. long and a steel inner cartridge five in. in diameter by 24 in. long, loosely packed with Fiberglas. A cast aluminum head with inlet and outlet openings is bolted to a flange welded to the outer shell.

Air enters the inlet opening and passes down between the inner and outer shells. Expansion of the air and the extensive cooling surface that is provided by the design cause any moisture that is in the air to condense and fall to the bottom of the outer shell, where it is discharged through the drain valve. The air then passes through the Fiberglas in the inner cartridge, which baffles out any remaining moisture without appreciably reducing the pressure in the line. The non-absorbent Fiberglas will last for many years, so that the filter requires no servicing except frequent draining to remove the accumulated water and oil.

T-12-881



Surface Grinder

The Blanchard Machine Co., 64 State St., Cambridge 39, Mass., announces a large surface grinder which has been added to their standard line. This rotary table vertical spindle grinder is designated the No. 42-72-84. The wheel spindle carries a 42 in. diameter abrasive wheel. The chuck, or work table is fully magnetic, 72 in. in diameter, and machined from a solid steel disc. A 6 in. wide extension ring around the table is non-magnetic and increases the table diameter to a total of 84 in.

The wheel spindle can be equipped with a 75 or 100 hp built-in electric motor.

Weighing more than 30 tons, the massive grinder measures 10 ft 7 in. in width and 20 ft in length.

T-12-882

Metal Forming Machine

A new model "Bendit" metal forming machine is announced by Kilham Engineering, Inc., with capacity to bend 15 in. of 18-gage mild steel or equivalent. This machine forms sheet, strip and rod stock and small tubing into various simple and complex shapes.

The manufacturer states "Bendit" will form any desired radius from 1/32 to 5/8 in., will make boxes up to 15 x 15 x 5 in., handles low ductile materials as well as plated or painted metals without fracture or injury to the surface where the radius of bend is large enough to avoid cracking the paint. Bends of any angle, including complete folds, and partial bends can be made.

The machine was developed primarily for short-run production work, such as forming aircraft components. It eliminates the need for expensive dies and intricate tooling, is provided with positive stops and gages for accurate duplicating, is open-ended front and back for feeding long strip stock.

Interchangeable bending blades of soft steel are supplied, to be cut or sawed to size to meet job requirements. The actual bending is done by a hardened and ground steel roller.

For new catalog write Kilham Engineering Inc., Plainville, Mass.

T-12-883

Quench Tank

A quench tank of the constant-level, re-circulating type is being introduced by A. D. Alpine, Inc., of 11837 Teale Street, Culver City, California.

Designed to receive work from a mechanical loader which removes the entire load from the furnace and quenches it in one operation, this Contro-Therm quench tank cools as it circulates the quenching liquid. Moreover, an airflow circulator can be added to make it usable with more than one furnace.

In addition to the main quench tank, this single piece of equipment includes a reserve and cooling tank, pump, and motor. The legs are high enough to allow a loader to slip under it so that the load can be deposited mechanically in the quenching liquid.

Overall dimensions of the quench tank are: 30 in. x 42 in. x 30 in. Pump motor is ¼ hp, 110-volt, single-phase. **T-12-891**

Welder's Goggle

A welder's goggle, featuring removable and adjustable binder-type leather side shields, is announced by American Optical Company, Southbridge, Mass.

The goggle can be adjusted for perfect fit and maximum comfort by loosening the endpiece screws. By removing the endpiece screws, side shields can be taken off for cleaning, sterilizing or replacing.

The side shields of the new goggle are made of soft leather, providing greater comfort and increased protection against heat, harmful light and flying particles. The cylinder bridge and reinforcing bar are also covered with leather. **T-12-892**

Spring Design Aid

Problems of spring design are quickly and easily solved with the Calculaide Spring Computer devised by American Hydromath Corp., 145 W. 57th St., New York 19. This new spring computer correlates, in one setting, all the variables in spring design, viz., OD of the spring, wire size in diameter and gage number, number of active coils, material and its torsional modulus, G, maximum sheer stress, load and total deflection.

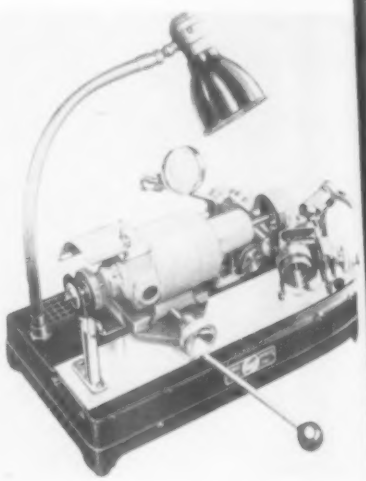
All figures can be read off directly without any intermediate computation whatsoever, as no reference is made to a standard load, or a standard stress, or a standard G, or a standard number of coils. The stress scale includes the correction for non-linear distribution of torsional stresses in curved wires.

The Calculaide Spring Computer is sults for great deflection of extension springs, in which case the contraction of the coil diameter at steep helix angles causes a stiffening of the spring, reducing the deflection below the values obtained from customary formulae.

The Calculaide Spring Computer is produced from sheets of tough, non-warping, dimensionally-stable Vinylite plastic. All markings and scales are indelibly laminated into the body of the plastic itself. Only 11⅜ x 5 in., it is a rugged instrument unaffected by moisture, perspiration or ink, and is easily cleaned with a damp cloth. Contrasting colors enhance readability and ease of setting. All scales appear on one side of the computer. T-12-901

Drill Grinder

A drill grinder for 2-lip twist drills from No. 70 to ¼ in., either straight or tapered shank, is announced by The Dumore Co., Racine, Wis.



This tool offers the small drill user economies in increased hole production, lower drill costs, reduction of scrap loss, and improved hole finish and tolerance, according to the maker. With the Dumore drill grinder, the user can quickly and accurately obtain any included angle of drill point from 90 to 160 deg, and any clearance angle from 5 to 15 deg. Setup is fast and positive.

The quick-locking chuck features an infeed for finish cuts on fine resharpening work, for very small drill sharpening, and for extra speed when extreme changes in point or clearance angle are required. A combined drill rest and diamond holder is provided for pre-grinding broken drills and dressing rough grinding wheels.

Powered by 1/5-hp, 115-volt Dumore motor (230 volts can be supplied), the drill grinder swings a 2 x ⅜ x ¼ in. wheel for sharpening. An identical wheel is mounted on the other end of the motor armature shaft for rough grinding broken drills to shape, together with a thinner wheel for web thinning. Standard equipment includes 1¼-in. collet; chuck extension drill holder for Nos. 52-70 drills; diamond wheel dresser; and setup gage.

Illustrated bulletin available on request to the company. T-12-902

USE READER SERVICE CARD ON PAGE 97 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Press in Miniature

The Metalix Micro Press is the first of a line of tools for instrument and small parts production to be announced by Metalix Manufacturing Co., 26 Fitch St., Norwalk, Conn., (makers of the Westlake watch repair tools).

The Micro Press is a small, highly versatile press for light duty precision operation in staking, punching, piercing, reaming, broaching, marking, forming, and riveting. Tools are guided by an adjustable cross arm mounted on a tool steel column. A hardened, ground, and lapped tool steel guide bushing in the cross arm gives continuous, positive tool alignment. The standard adjustable fixture plate mounted on the base is hardened and lapped for accuracy, and contains 21 holes ranging from 0.013 to 0.185 in. in diameter. Clearance between the fixture plate and cross arm is adjustable up to 1¼ in. Standard models are provided with a hand press lever. A variety of punches with a wide range of end shapes and sizes are maintained in stock.

In addition to the standard Micro Press, Metalix offers a special model with a micrometer depth adjustment. Special tools, fixtures, and power adaptions are also available on order.

T-12-911

Rustproofs Surfaces

Moving parts made of iron and steel can get two-fold protection with a chemical treatment made by Octagon Process, Inc., 15 Bank St., Staten Island 1, N. Y. Known as "Rustshield 2," it is a phosphatizing compound which changes steel and iron surfaces to rustproof, highly absorbent nonmetallic areas. This surface is a coating produced from chemical interaction of the phosphate solution and the metal surface thus it has greater adherence than any physically-bonded coating could have. Metal parts so treated will remain properly lubricated far longer than smooth steel surfaces. Danger of scuffing and galling is virtually eliminated and break-in time is reduced.

Although parts treated are corrosion-resistant, the degree of such resistance can be increased by finishing with a drying oil or wax such as yellow beeswax; the retentive qualities of this type of phosphate coating are thus utilized.

Close tolerances are not affected by the phosphate treatment. The oil-retentive qualities of a treated metal surface are due to the "hills and valleys" formed during the process; however, these depressions are microscopically small, and are so numerous, that the uniform nature of the surface remains unchanged. Thus, metallic parts with precise dimensional tolerances can be Rustshielded without fear of ruining many hours of costly machining time.

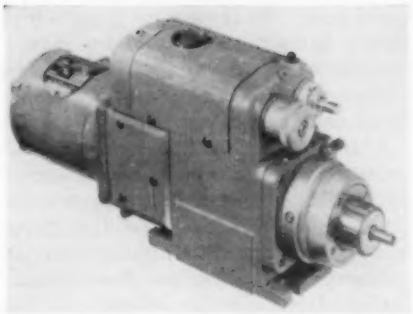
Rustshielding is an immersion process which consists of precleaning with vapor degreaser, safety solvent, or an alkali cleaner. Cleaning is followed by rinsing, Rustshielding, rinsing, and final treatment with a passivating agent. The Rustshield liquid is applied by hot immersion, and outside of a stainless steel tank, requires no special equipment.

Further information can be obtained from the company's Technical Service Department. **T-12-912**

Air-Hydraulic Drill Unit

The Delta Power Tool Division of the Rockwell Manufacturing Company has announced the introduction of the Delta 19-150 air hydraulic drill unit.

It is designed for high production work on drilling, reaming, tapping, chamfering, spot-facing, centering, etc. The 19-150 is a basic unit adaptable to special machines for high production drilling, etc. With their built-in switches, any number of these units can then be mounted on a framework and can be electrically interlocked with the fixtures, index mechanisms, etc. to become a special machine.



Thrust is obtained by the Delta air-hydraulic drill unit from energy received from the plant compressed air supply. Its feed control is a sealed pumpless hydraulic system. The depth controls are adjustable positive stops. The normal cycle gives rapid advance to the work, drilling feed, and rapid return. The motion is absolutely firm, smooth, and free from lost motion. The sealed unit construction permits operation of the unit in any position without changes.

The 19-150 unit takes up to 5/16-in. drill in steel and a 1/3- or ½-hp motor. The spindle may be driven by the motor directly, through a gear train or by belts.

For information and literature, write to the Delta Power Tool Division, Rockwell Manufacturing Co., 600 E. Vienna Ave., Milwaukee, Wisconsin. T-12-921

Oil Mist Precipitator

The hazardous problems caused by the fine oil mist emanating from high speed cutting and grinding machine operations can now be eliminated by an oil mist precipitator developed by Trion, Inc., McKees Rocks, Pa. This equipment has been designed to meet the requirements of industry, and is based upon the electrostatic precipitation principle of attraction. Oil mist from machining operations is charged as it passes through an electrostatic field and is then attracted to plates of opposite polarity from which it eventually drains into a collecting pan for ultimate re-use.

The Trion oil mist precipitator protects machinery and factory interiors such as walls, floors, and ceilings from oil mist which tends to coat these interior surfaces, creating a possible fire hazard and necessitating frequent cleaning. Another advantage is the elimination of unhealthful effects of oil mist on the machine operator. Machinery hoods for exhausting the oil mist to the outside atmosphere are eliminated and at the same time air pollution is prevented.

The Trion oil mist precipitator is constructed of heavy sheet metal throughout and of a compact design requiring only a minimum of space. It is adaptable for floor mounting or overhead ceiling suspension. For further information, write the manufacturer.

T-12-922

D-C Microswitch

Micro Switch, Freeport, Ill., a division of Minneapolis-Honeywell Regulator Co., announces the first of a series of small-size magnetic blow-out switches for use in switching high-voltage d-c circuits. These new designs of snap-action switches open a new field of use in d-c circuits in industrial equipment, on railway equipment, street cars, and other direct-current applications.

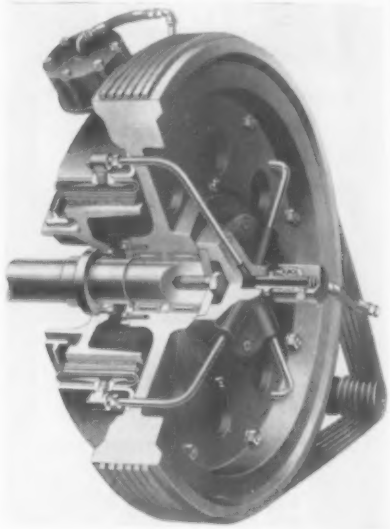
Micro magnetic blow-out switches are of the same dimension as the standard Micro precision switches built for a-c switching. The plastic case containing the switching unit measures 1-15/16 x 11/16 x 27/32 in., and weighs less than one ounce. The MT-4R pin plunger switch is interchangeable with other Micro pin plunger switches in Micro auxiliary actuator brackets and metal enclosures that provide supplementary actuation means, protection and mounting facility. **T-12-931**

USE READER SERVICE CARD ON PAGE 97 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Air Friction Clutch

A Press-Rite airflex air friction clutch and spring and air-applied brake combination for use with their line of Press-Rite power presses, has been announced by the Sales Service Machine Tool Co., 2363 University Avenue, St. Paul, Minn.

Interlocking clutch-brake action, long, maintenance-free life and increased operator safety are advantages claimed for the new clutch-brake arrangement.



The clutch and brake are both of the constricting drum type, and therefore utilize centrifugal force to assure instant disengagement of friction surfaces when released. The brake is applied by a constant pressure spring opened and released by air and its actuation opens a valve to release air from the clutch. Interlocking of clutch and brake action prevents either from being engaged while the other is operating. If air or electric power fails, the clutch disengages and the spring brake stops the press instantly.

The clutch is designed for optimum efficiency at pressures from 40 to 80 lb. and will operate satisfactorily at as low as 25 lb. The 360-deg. contact of friction surfaces provides full operating power for a given clutch gripping pressure.

T-12-941

Electronic Guard

Dual Channel Protectron, the latest development in electronic damage prevention methods, now makes possible the simultaneous protection of two machines when one is feeding to the other in joint first and secondary operation.

In the event of pile-ups, misfeeds, tool dullness, overhard or oversized stock, or any other cause of mechanical overload that might result in serious damage to the machines, the Dual Channel Protectron senses the mechanical overload and stops both machines.

Made by The Brinnell Company, Simsbury, Conn. **T-12-942**

Tumbling Compound

Tumb-L-Magic, a wet-process tumbling compound, has been added to the line of tumbling equipment, compounds and techniques that comprise Tumb-L-Matic Processes for metal and plastics finishing. The special properties of this new formulation are attributed by the manufacturer to the greater abrasive action of the media because of the chemical cleaning action of Tumb-L-Magic. The cleaner acts to suspend grease and cuttings in the solution, thus keeping work surfaces and abrasive media free of action-retarding accumulation. Tumb-L-Matic, Inc., 4510 Bullard Ave., New York 70, N. Y.

T-12-951

Air Press

Famco Machine Company, Racine, Wis., has just announced the addition of an air press to its line. Twenty models are included with ½ to 3½ ton capacity.

This press is said to be the first air press designed for production use offering so many design features, and such a complete range of models with built-in controls.

Heading the list of features is the frictionless cylinder of diaphragm design requiring no lubrication of any kind. All models have a built-in pressure gage, infinitely adjustable stroke coupled with extra-long maximum strokes, ram keyed to prevent rotating, large working surface, and infinite vertical adjustment with no bolts to loosen or remove.

T-12-952

Good Reading . . .

A Guide to Significant Books and Pamphlets of Interest to Tool Engineers

ANALYSIS OF THE FOUR BAR LINKAGE, by John A. Hrones and George L. Wilson. Published jointly by John Wiley & Sons, Inc., New York, N.Y., and the Technology Press of the Massachusetts Institute of Technology. 730 pp.; price $15.00.

Presenting, as it does, an entirely novel approach to problem of the synthesis of mechanisms to produce desired motions, the work may be said to be outstanding in its field. The authors, respectively head of the machine design division and director of the Dynamic Analysis and Control Laboratory, and assistant professor of mechanical engineering at M.I.T., provide an exhaustive survey of the "displacement and velocity characteristics of a 4-bar linkage in the range of operations where the driving crank makes a complete revolution while the follower crank oscillates."

It is a large book, and the diagrams —measuring 11 x 17 in. and including over 7,000 displacement paths—represent about 500,000 solutions. The book is conspicuous for its absence of text; however, an application formula is tied in with each illustration. By means of the formulas and clearly delineated diagrams, however, the designer of machine tools, computing machines, conveyor equipment and other appliances including toys, can readily locate the basic dimensions of a required linkage. In many instances, this can be accomplished without resort to mathematical computation or use of cams.

MATERIALS HANDBOOK, by George S. Brady. Published by McGraw-Hill Book Co., New York, N.Y. Seventh edition, 913 pp.; price $8.50.

This handbook gives practical ideas on some 9,000 materials, thereby providing a consistently useful source of information on their selection for specific applications. Materials listed include metals, woods, alloys, refractories, abrasives and so on, all arranged and indexed for quick reference. Patented and trade-named materials also discussed since, in many instances, they are raw materials for industry.

A feature of the book is Part II, which presents basic information on the economic geography of materials, resources, weights, measurements, and physical comparisons. This information enables purchasing agents to understand both the "how" and "why" of buying materials in clearly defined terms.

CARBIDE CUTTING TOOLS, by Warren Baker and Joseph S. Kozacka. Published by the American Technical Society, Chicago, Ill. 416 pp., illustrated. Distributed by the Educational Training Dept., Vascaloy-Ramet Corp., Waukegan, Ill. Price $5.50.

The authors—the one a retired editor of *Science and Mechanics* and currently managing partner of the Model Engineering Co., Chicago, the other associate professor of mechanical engineering at University of Illinois and engineering consultant for Vascoloy-Ramet Corp. and supervisor for the Illinois Institute of Technology, and both authorities on carbide tooling—give unusually complete information on carbides as applied to cutting problems.

The book covers the development of cutting tools from their known beginning to eventual conversion to carbides. The balance of the 17 chapters deal with converting, tool angles, tipping, grinding, power speeds, coolants and so on through from design to application. Along with the book, Vascoloy-Ramet furnishes a study guide, prepared and sponsored by the American Technical Institute, which may be used at home, by the individual, and at the plant for employee training programs.

AIRCRAFT MATERIALS AND PROCESSES by George F. Titterton. Published by the Pitman Publishing Corp., New York, N. Y. Fourth edition, 359 pp, price $5.00.

Currently assistant chief engineer of the Grumman Aircraft Engineering Corporation, the author has added in this edition of his book the necessary material to cover the major developments in the aircraft industry during the past four years. The contents of the book will be of interest to the newcomer as well as the experienced engineers, designers and mechanics in the industry.

In general, the author describes the latest materials and processes used in the construction of modern aircraft. Suggestions have been included for the choice of a material for a particular job and on the best methods of working, heat treating and finishing materials for a specific application.

Of interest to those not in the aircraft industry will be the information on new techniques and new materials which may be adapted for use in other parts of the metalworking industry.

THE TOOL ENGINEER'S *Service Bureau*

TRADE LITERATURE CURRENTLY OFFERED BY THE TOOL ENGINEER ADVERTISERS

LITERATURE NUMBER	COMPANY	BULLETIN	DESCRIPTION
A-12-139	Allegheny Ludlum Steel Corp.		Four-page "Blue Sheet" gives technical data on their B-47 hot work steel.
A-12-116	American Broach & Machine Co.		"Blue and Gold" catalog of broaching equipment gives complete machine specifications.
A-12-28	F. E. Anderson Oil Co.		Informative twenty-page booklet on Lusol, all-chemical metalworking solution.
A-12-102	Armstrong Bros. Tool Co.		Catalog presents company's line of tool holders suggesting proper holder for each operation on lathes, planers, etc.
A-12-15	The Baird Machine Co.		"Case Histories Bulletin" discusses use and operation of its multiple transfer presses. Other bulletins deal with company's slide machine, 76H chucker and 5.4 VD lathe.
A-12-164	Balas Collet Manufacturing Co.	50	Catalog and price list cover company's line of collets stressing economy and durability.
A-12-154-2	W. O. Barnes Co., Inc.		"Handbook of Metal Sawing", illustrated, contains facts, figures, tables, charts based on production experience and compiled by experts in the field.
A-12-135	E. A. Baumbach Mfg. Co.		Catalog shows complete line of stamping accessories as well as wide variety of sizes and styles of die sets.
A-12-161	Charles H. Besly & Co.		Tapping manual contains late data on tap selection and applications and best tapping procedures.
A-12-110-1	Boice-Crane Co.		Three brochures deal with: Boice-Crane drill presses; band filer; and band saws.
A-12-147	Brown & Sharpe Mfg. Co.		Complete small tools catalog deals with company's line, emphasizing soundness of design, reliability.
A-12-23	The Carborundum Co.		Tool grinding booklet, "Maintenance of Alloy and High Speed Steel Cutting Tools" contains detailed information, charts, illustrations.
A-12-157	The Carpenter Steel Co.		Sixty years' experience in applying tool steels is summarized in "Matched Tool and Die Steel Manual".
A-12-152-2	Cerro De Pasco Corp.		Information and illustrations of Cerromatrix method of punch and die setting contained in "Cerro Alloys Application Data File".
A-12-112-1	Chicago Rivet & Machine Co.		Engineering information, rivet specifications and illustrated descriptions of automatic rivet setters presented in rivet catalog.
A-12-4	The Cincinnati Shaper Co.	N-5	Catalog fully describes line of shapers stressing versatility and power.
A-12-114	Crucible Steel Co. of America		Tool Steel Selector permits accurate choice of proper steel for specific job when only known factor is characteristics that come with job.
A-12-126-2	The Denison Engineering Co.		Production-tip 16mm moving pictures, available for technical meetings, training school programs or production clinics.
A-12-96	"Die Techniques" Publishers	77	Bulletin discusses information contained in company's handbook on dies.
A-12-151	The DoAll Co.		Bulletin describes DoAll's precision surface grinders.
A-12-143	The DoAll Co.		Information on band filing, emphasizing speed, economy, covered in illustrated brochure.
A-12-91	Erickson Tools	J	Catalog deals with line of precision holding tools.
A-12-78	Golconda Corp.		Circular "The Story of Sta-Sharp Diamond Tools" gives full details and prices; Catalog presents complete line of diamond tools for wide variety of uses.
A-12-138-1	Graham-Mintel Instrument Co.		"Indi-Ae" bulletin gives details on electronic indicator for laboratory precision in all-around shop gaging.
A-12-79	Grobet File Co. of America, Inc.	HF2, HR2 F3, HB1, HC	Various catalogs deal with company's lines of Swiss files, rotary files, rifflers, burs and countersinks.
A-12-80	Hammond Machinery Builders, Inc.	701	Bulletin shows motorized solid carbide insert grinding fixture.

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TRADE LITERATURE CURRENTLY OFFERED BY THE TOOL ENGINEER ADVERTISERS

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A-12-30	Hanna Engineering Works	236, 238, 254	Three different catalogs treat low pressure cylinders, hydraulic cylinders and valves respectively.
A-12-20	Hannifin Corp.	150	Bulletin—"Hydraulic Power" Hydraulics—presents thorough discussion of how equipment can be best utilized in individual plant.
A-12-14	Haynes Stellite Co.		Manual-catalog "Haynes Stellite Metal-Cutting Tools" tells story of company's cobalt-base tool alloys.
A-12-159	Illinois Tool Works.		"Metallurgy in Tool Design and Production" explains advantages of modern metallurgy; characteristics of various tool steels are tabulated for checking against specific need; types of surface treatments discussed.
A-12-112-3	Kaufman Mfg. Co.	1150	Catalog describes Kaufman precision built tapping machines for continuous production.
A-12-2	Landis Machine Co.	F-90	Information on details, operation and production application.
A-12-144-3	W. F. Meyers Co., Inc.	13	Catalog of line of carbide inserted bushings stresses main features and advantages.
A-12-136-2	Oakite Products, Inc.		Twenty-four page illustrated booklet "Facts about removing carbon, Grease, Dirt, Paint" stressing 9 main advantages.
A-12-89-2	O'Neil-Irwin Mfg. Co.		"Die-Less Duplicating" catalog presents story of Di-Acro punch and press equipment.
A-12-150-2	Procunier Safety Chuck Co.		Brochure gives complete details and specifications for tapping heads with "Tru-Grip" Tap holders.
A-12-108	Rogers Machine Works.		Fully illustrated catalog of Rogers' vertical turret mills.
A-12-152-1	The Ruthman Machinery Co.		Easy-to-read catalog explains construction, operation and advantages of Gusher machine tool coolant pumps.
A-12-150-3	Scully-Jones and Co.	15-30	Bulletin on company's engineering and design service demonstrating time- and money-saving features.
A-12-90	Severance Tool Industries, Inc.		"All Star" brochure lists countersinks, ball seat reamers and other tools of "chatterless" tooth arrangement.
A-12-144-2	South Bend Lathe Works.	5120	Catalog deals with South Bend's precision turret lathe, operation and advantages.
A-12-5	Standard Gage Co., Inc.	B	Line of gages discussed in catalog emphasizing economics and other advantages.
A-12-87-1	D. A. Stuart Oil Co.		"Shop Notebook"—bi-monthly publication dealing with selection and application of metal-working lubricants.
A-12-126-1	Swarts Tool Products Co., Inc.	941	Catalog presents information on company's standard drill jigs and fixture locks.
A-12-124	The Taft-Peirce Mfg. Co.		Handbook covers line of precision made inspection and production tools plus information on other manufacturing aids.
A-12-140-3	The V & O Press Co.		Illustrated booklet on "Feed-O-Matic" power press feeder for secondary die operations.
A-12-130	Valley Machinery & Supply Co.		Company's new tip-brazing unit described in illustrated catalog.
A-12-154-3	The Van Keuren Co.	34	Two years of research represented in 208-page handbook and catalog of data on measuring and gages.
A-12-128	Wales-Strippit Corp.	DM	Complete story on Wales drilling machine contained in illustrated catalog.
A-12-140-1	Waukesha Tool Co.		Full specifications for all models of Waukesha cutting tools listed in concise catalog which also describes company's manufacturing, engineering and designing facilities.
A-12-84	S. B. Whistler & Sons, Inc.		Catalog shows cost-cutting advantages of magnetic perforating punches and dies.
A-12-142	Wiedemann Machine Co.	241	Bulletin describes most efficient method of producing chassis and similar work in short and semi-production runs.

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Technical Shorts . . .

DEVELOPMENT OF promising new uses for by-products of the atomic energy program must wait for the solving of many technical and economic problems, according to the findings from the recent survey of industrial uses of radioactive fission products.

This was the conclusion suggested from the Stanford Research Institute's study made for the United States Atomic Energy Commission.

Vast numbers of curies of radioactivity are contained in the process wastes left over from the production of plutonium in the AEC's nuclear reactors. Although of no usefulness for industrial or explosive power or as a heat source, these fission products are a potential source of large quantities of low-cost radiation. The study indicates that refinement and concentration of the gross fission products probably will be necessary to make them suitable for industrial purposes.

Present commercially feasible industrial uses include the activation of phosphors for self-luminescent signs and markers, static eliminators for a variety of industrial processes and in process control instruments which incorporate a source of radiation.

Possible future uses for fission products include industrial radiography and portable low-level power sources. At least two to five years will be required for development of technology and desirability of use in these cases.

The technological development of the industrial applications are to be found in various stages. One table in the report summarizes the approximate state of technological development of selected large-scale potential uses, fission products required, and the maximum value-in-use or competitive price, size of the market and the nature of the competition.

The technological and marketing problems confronting the Commission in making fission products available to industry are, of course, difficult. These include technical problems involved in the design of processing plants to separate the fission products; engineering the sources of radioactivity into a form suitable for various purposes; and supplying fundamental knowledge on which to base development of industrial applications. In addition, marketing problems must be faced—pricing policy, promotional effort, engineering services, mechanics of distribution, personnel training, patent policy, inspection and reports and education.

Definite signs indicate that both industry and the Commission are beginning to progress with research programs aimed at developing large-scale uses for fission products, according to the report.

The announcement last July that Brookhaven National Laboratory has a 1,000-curie source available for experimental use by industry has met with immediate industrial acceptance. The AEC is sponsoring research programs at Brookhaven, Massachusetts Institute of Technology, the University of Michigan, and Yale, Columbia and Syracuse universities, aimed at assisting industry in this field. A number of prominent industrial concerns have expressed interest in pilot plant operations, especially in the field of radiation sterilization, as suitable fission products become available.

To encourage further study by industry of possibilities of use, the Commission has authorized the Institute to make the report available at cost.

BY FOLLOWING photographically the flow of molten metal through the channels in a mold, Navy researchers are finding that rearranging of these channels produces changes in smoothness. This is believed to be a key to better castings.

The gating systems, i.e. connecting pipes that lead metal into casting mold, were formerly designed on the assumption that the metal would flow where open channels existed. However, the investigation indicated that metal flowing freely in a channel may continue along preferential straight line paths without entering available side channels or openings. The study revealed that if suitable enlargements were made at some points in the channels and suitable restrictions at others, metal would flow uniformly into all cavities of the mold, thus producing sound castings.

UP-TO-DATE information on steel foundries in the United States, Canada and Mexico has been assembled in one complete reference volume by the Steel Founders' Society of America.

Separate sections present detailed data on individual foundries in each of the countries. Information breakdowns on personnel, production equipment, types of castings produced, capacities, trademarks and related data supplement the list of steel casting facilities.

The *Directory of Steel Foundries* is available from the Steel Founders' Society's headquarters. **$10.**

North East West South IN INDUSTRY

W. Burl Saul has been named vice president in charge of production and engineering of **L & J Press Corp.** Mr. Saul, who has been associated with the press industry for the past 24 years, was formerly a partner in Power Press & Equipment Co.

Clarence W. Halleen has been appointed superintendent of **Norton Company's** Plants 1, 2 and 3 as well as supervising tunnel kilns and vitrified molding in Plant 6. In these duties, Mr. Halleen replaces Irving B. Loud who has retired after 35 years with the company.

Louis P. Smith has been named manager of the **Morse Chain Company's** Ithaca plant. Prior to joining Morse Chain, Mr. Smith was in charge of designing, equipping and staffing a new plant of the Deepfreeze Appliance Div. of Motor Products Corp.

E. H. Rocks has recently been advanced to the position of vice president of **Greene Manufacturing Co.**, a subsidiary of **The Dumore Co.** Mr. Rocks, formerly chief engineer at Greene, will continue in charge of engineering for metalworking production.

According to recent announcement, **A. J. Wilhelm** has been elected vice president in charge of manufacturing by the board of directors of **Clearing Machine Corp.** Mr. Wilhelm, who has been associated with Clearing since its founding, will assume responsibility for servicing the company's product, in addition to his previous duties.

A. J. Wilhelm

Roger E. Gay

According to an announcement made at the **American Standards Association's** recent annual meeting, **Roger E. Gay,** president of The Bristol Brass Corporation, was elected ASA president. At the same time, **Edward T. Gusheé,** vice president of Detroit Edison Company, was elected to the vice presidency.

Also recently announced was the appointment of **Theodor D. Meyer,** formerly superintendent of **Australian Abrasives Pty., Ltd.,** Norton associate company in Australia, to the post of production engineer of the Abrasive and Wheel Div., **Norton Behr-Manning Overseas, Inc.**

L. K. Stringham has been appointed chief engineer for **The Lincoln Electric Co.** Mr. Stringham, a member of Lincoln's board of directors, has been director of welding development for the past two years, working in experimental research as well as product development.

According to recent announcement, **F. C. Ludington,** manager of **Allis-Chalmers Manufacturing Company's** control section since 1946, has been named manager of the company's Hawley Works. In this post, Mr. Ludington will direct sales, engineering and manufacturing of control apparatus and the manufacture of other products produced in the Hawley Works.

OBITUARY

Robert N. Blakeslee, vice president and director of engineering of **Ajax Electrothermic Corp.,** died recently. Mr. Blakeslee, who had been associated with Ajax Electrothermic for 24 years, became its vice-president in 1941.

Floyd E. Mengel has been appointed general manager in charge of sales and manufacturing for the **Morton Machine Works.** Mr. Mengel joins Morton after eleven years' experience in this line.

At the same time **Eric Butterwork** was named manufacturing superintendent for the company following a background of similar work for a national manufacturing company.

At the recent annual meeting of the **National Tool and Die Manufacturers Association, Randolph H. Cope** was elected as president of the organization for the coming year. Mr. Cope is vice president and manager of The Bunell Machine & Tool Co.

Other officers elected included **Alfred Reinke,** president of Gus Reinke Machinery & Tool Co., first vice president; **Herbert C. Murrer,** president of Murrer Tool Co., second vice president; **Herbert Harig,** vice president and treasurer, of Harig Manufacturing Corp., treasurer; and **Joseph N. Huser,** president of B & H Specialty Co., secretary.

Four members of the research staff at **Battelle Institute** have been promoted to supervisory positions as a result of the Institute's expanding research program. **Dr. Horace J. Grover** has been named supervisor of research on fatigue and structural analysis; **Arthur D. Schwope,** supervisor of research in mechanical metallurgy; **Henry A. Saller,** supervisor of research on special metallurgical materials, and **Charles F. Lucks** as supervisor of the instrument division.

Also from Battelle Institute, **Lloyd R. Jackson** was named to fill a recently created assistant directorship. Mr. Jackson, who is particularly experienced in work on engineering properties of materials, will handle research coordination.

Frank A. Votta, Jr. has been appointed chief engineer of the **Hunter Spring Co.** Mr. Votta, who has been associated with the company for ten years, formerly was engineer in charge of design in Hunter's Neg'ator Division. In his position as chief engineer, Mr. Votta will head engineering, design and research activities in all phases of the company's operation except the Neg'ator Division. He also will handle engineering problems in development of manufacturing processes, and the improvement of present equipment and techniques.

Coming Meetings

Jan. 14-17. Third **Plant Maintenance Conference,** to be held concurrently with Plant Maintenance Show; Convention Hall, Philadelphia.

TRADE LITERATURE

Free Booklets and Catalogs Currently Offered By Manufacturers

Hobbing

Universal single-spindle high-speed gear hobber described in bulletin 1458A; progressive action illustrations show hobbing of typical gears; diagrammatic gear layout shows how smoothness has been obtained. Complete description of the machine, important highlights and a specification table included. **Michigan Tool Co.**, 7171 E. McNichols Rd., Detroit 12.

L-12-1

Switches

Illustrated brochure shows in detail combinations available of rotary packet switches for controlling electrical circuits operating at current ratings of 10, 25, 30, 60, 100, 200 and 500 amps and voltage ratings from 115 to 600 v ac and up to 250 v dc; gives engineering data, ratings, dimensions and mounting types. **The Arrow-Hart & Hegeman Electric Co.**, 103 Hawthorn St., Hartford 6, Conn.

L-12-2

Grinding, Finishing

Catalog No. 75 shows general purpose grinders, polishing lathes, various type "Duskolectors" describing main features, construction and operation; specifications and dimensions included. **Hammond Machinery Builders, Inc.**, 1600 Douglas Ave., Kalamazoo, Mich.

L-12-3

Metal Cleaning

Based on successful applications in aircraft manufacturing plants, 48-page booklet reports details on specific materials and methods for performing many production cleaning and related operations, including preparing aluminum for anodizing, for spot welding, for painting by various methods, cleaning aluminum before and after heat treating and other work, emphasizing simplicity and economy. **Oakite Products, Inc.**, 158 Thames St., New York 6.

L-12-4

Speed Reducers

Pocket-size catalog, "Abart Speed Reducers and Gearmotors," shows company's line of small-sized units; gives engineering data on selection of proper unit to fit requirements, including horsepower ratings, ratios and installation graphs. **Abart Gear & Machine Co.**, 4834 West 16th St., Chicago 50.

L-12-5

Power Drivers

Bulletin describes and illustrates power driving equipment for use with company's self-tapping screws for production line use emphasizing speed and efficiency; includes portable and suspended electric and air tools, single-and double-spindle automatic hopper-fed screw inserting machines; also discusses proper bits and sockets. **Parker-Kalon Corp.**, 200 Varick St., New York 14.

L-12-6

Magnifier

Folder presents "Magni-Focuser" binocular eye loupe showing its applications in various fields to reduce hazards, relieve strain, aid in precision work, and inspection. Lists prices and various magnifications available. **Edroy Products Co.**, 480 Lexington Ave., New York 17.

L-12-7

Comparators, Optical

Catalog No. 402 covers complete line of company's optical comparators giving basic principle, pointing out advantages; discusses uses for various types; photos, drawings and tables clarify discussions, present lens data and model specifications. **Jones & Lamson Machine Co.**, Springfield, Vt.

L-12-8

Socket Screws

Button head socket cap screw line presented in revised catalog 51 which features detailed engineering data; also contains full information of all products manufacturered by company's "completely cold forged" process; covers standard as well as special work made to order. **Holo-Krome Screw Corp.**, Hartford 10, Conn. **L-12-9**

Air Cylinders

Catalog Section 55, first of a series of catalogs illustrating and describing air and hydraulic valves and cylinders and power units, provides working drawings and specifications for each model and size cylinder, both standard and cushioned types. **Rivett Lathe & Grinder, Inc.**, Brighton 35, Boston, Mass. **L-12-10**

Cylinders

Twenty-eight page bulletin No. 101 deals with air, hydraulic and water cylinders; full diagrams, engineering specifications and data on company's internal locking system present features of various types. **Ortman-Miller Co., Inc.**, 1200 150th St., Hammond, Ind. **L-12-11**

Alloys, Aluminum Bronze

Revised 20-page bulletin PI-3 gives complete information on company's aluminum bronze alloys as applied in corrosion-resistant service; also includes data on cavitation-pitting as well as physical and chemical properties of various alloys. **Ampco Metal, Inc.**, 1745 S. 38th St., Milwaukee 46, Wis. **L-12-12**

Pumps

Folder 52B7529, "Allis-Chalmers Package Pumps," deals with equipment engineered for a wide range of fractional horsepower applications in capacities to 80 gpm at heads to 100 ft; engineering drawings and performance graphs show capacities and dimension of various types. **Allis-Chalmers Mfg. Co.**, 1004 S. 70th St., Milwaukee, Wis. **L-12-13**

Metal-Working

Recent manufacturing and processing technique data supplement information gained from defense production experience during World War II to make up 52-page booklet on heat treating and metalworking operations involved in processing shells, cannon, small arms, ammunition and rockets and other defense items; covers drawing operations, including cold extrusion of steel; machining; metal cleaning and rust preventives. Distribution restricted to metalworking plants filling defense orders. **E. F. Houghton & Co.**, 303 W. Lehigh Ave., Philadelphia 33. **L-12-14**

Abrasive-Belt Machines

Catalog presents factual descriptions of abrasive-belt machines with information on each unit, its operation and scope of its uses; widely illustrated, literature contains data and specification tables. **The Porter-Cable Machine Co.**, Syracuse 8, N. Y. **L-12-15**

Press Room Equipment

Bulletin 80 describes and illustrates company's line of automatic press room equipment including slide and roll feeds, stock straighteners, stock reels and coil cradles used in connection with punch presses. **U. S. Tool Co., Inc.**, Ampere (East Orange), N. J. **L-12-16**

Presses

Owner's manual contains complete operating and maintenance instructions for company's straight-side double-crank presses. Includes list of specifications. **E. W. Bliss Co.**, Canton, Ohio. **L-12-17**

Drill Heads

Literature on company's two-spindle adjustable drilling head includes parts list for all models, adaption instructions for attaching two-spindle adjustable drilling heads to drill presses, and price list; covers specifications, speed ratios. **Linderme Engineering & Sales**, 8126 Puritan Ave., Detroit 21. **L-12-18**

Abstracts of Foreign Technical Literature

By M. Kronenberg

Great Britain: The use of a fluxing agent in the soldering of the common metals performs two major functions, namely the removal and inhibition of oxides and the improvement of surface wetting of the parent metal by the solder. With metals such as copper and iron this can be carried out with weak acid, alkaline or other fluxes and does not present any great difficulty.

With aluminum and similar light metals the oxide layer is extremely tenacious, resisting all but the most virulent type of flux such as phosphoric acid. At the same time however, it presents many difficulties. To overcome these disadvantages, use has been made of ultrasonic vibration as discussed by A. E. Crawford in the September issue of *Metallurgia.* It has been known for some time that the application of high frequency vibration will produce erosion of the surface and in this way facilitate the soldering of aluminum parts considerably. The choice of frequency is governed by the nuisance value, and it has been found that 20,000 vibrations per sec. is sufficiently high to be inaudible and to induce at the same time cavitation. The new method is of major importance to the British Aircraft Industry where electrical equipment is becoming a weight factor and the soldering of many aluminum parts considered of great significance.

The French Research Organization of Gear Manufacturers *(Societ d'Etudes de l'Industrie de l'Engrenage)* has finished a comparative report on the problem of "Single- or Multi-Start Hobs" and has published the findings in an article by G. Henriot in the British edition of *Machinery* of October 11.

In considering the production of a given gear by hobbing, two important factors must be taken into account, namely the total cutting time and the required accuracy of the tooth profile. In addition, the maximum chip thickness also is involved, relating these factors to the number of starts in the hob and its diameter. The tooth form generated by a hob is not a smooth involute surface but consists of a number of rows of approximately flat facets, each row extending down the flank from the tip to the root. The facets are tangential to the theoretical involute and the

tooth form therefore has a maximum deviation from the involute given by a formula published in the article. Similar equations are derived for the total cutting time and the maximum depth of cut involving the number of starts in the hob, feed per revolution, total cutting depth of hob tooth, module, number of gashes in the hob, the overall diameter of the hob and the major diameter.

Tests carried out at the Renault Auto Works are discussed comparing the theoretical formulas with shop data and winding up with the conclusion that a single start hob of large diameter will produce the best surface finish.

A crankshaft grinding machine built on unusual lines and designed for simplicity in setting and operation was demonstrated at the recent European Machine Tool Exhibition held at Paris. This Belgian design of "*Les Ateliers de Constructions de Buyser*" is discussed in the October issue of *The Engineer*. The crankshafts to be ground are mounted vertically and the main bearings are first checked by means of dial gages to insure true running between upper and lower ends.

Another Belgian machine tool on exhibit was a lathe for high speed production developed by Le Progres Industriel equipped with a hydraulic copying attachment and an electro-hydraulical feeding attachment for bar stock.

Germany: The European Machine Tool Exhibition is covered in the current issues of technical magazines of every foreign industrial country. Of these accounts, the articles published by H. Opitz and H. Hacks in *Stahl und Eisen* of August 30, and by A. Raupp in *Zeitschrift des Vereins Deutscher Ingenieure* of September 1 are more than usual reports on the show. A comparison of the machine tool production in the USA and Western Germany is given in the article in *Stahl und Eisen* in addition to a discussion of general design developments, shape of machine elements, rigidity of structure, universal and special machines, reduction of down time and set-up time. It is also indicated there that a machine tool industry is developing in many of the smaller countries—among them Belgium and Holland—which formerly were buyers rather than sellers.

After the end of the war, the Krupp Works entered into an investigation of the merits of turning with negative rake angles and have published the findings in an article by H. J. Burmester in the September issue of *Werkstattstechnik und Betrieb*. The wear of the tool was measured at the tool flank, at the tool face and at the cutting edge in case of chipping. No relation between them was found, rendering it necessary to consider the concepts of "tool life" independently.

Wear on the tool flank increases, according to these tests, as the true rake angle of the tool becomes more negative, while the width and depth of the crater and the chipping on tool face and at the cutting edge was considerably reduced in the case of negative rake angles. This is due to the increase in the strength of the tool and the removal of the initial contact between work and tool from the cutting edge. This agrees with our own previous findings.

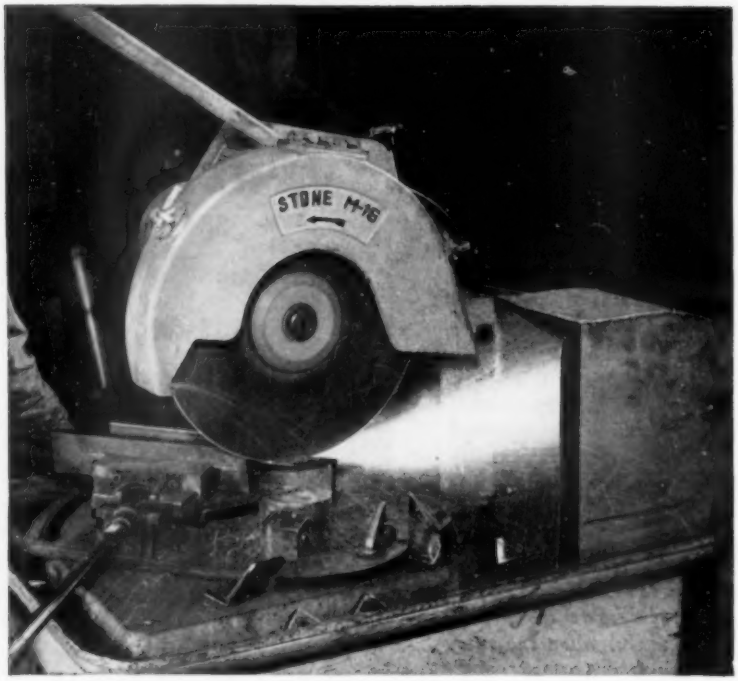
Negative rake angles are thus recommended when the resistance to chipping and cratering is more important than resistance to flank wear, which would be the case when it is desired to increase the feed, or of machining material of high tensile strength, or in cases of interrupted cuts, hard inclusion, scale, etc. Negative rakes are considerably more useful when the surface finish is of minor importance and when the feeds and speeds may be high.

The cutting force in the direction of the feed increases substantially more with negative rakes than the main (vertical) cutting force as indicated by the tests. It is also claimed that the chips break easier because they are more deformed in case of negative rake angles. No effect of the microstructure on the efficiency of negative rake angles was found.

Standards for metal cutting have been published by the Association of German Mining Engineers *(Verein Deutscher Eisenhuetten Leute)*. These standards, covering the basic principles, tool temperatures, wear criteria, machining methods and chip formation, are discussed by W. Leyensetter in *Zeitschrift des Vereins Deutscher Ingenieure* of September 11.

The effect of induction and case hardening of small gears on their strength and wearing qualities has been investigated by the Institute for Machine Design at the Engineering College of the University of Braunschweig, as reported by H. Glaubitz in the September 27 issue of *Stahl und Eisen*. The investigations covered the hardness of the flank of the teeth, distortion due to heat treatment, transverse strength, bending fatigue limit, wear resistance and impact strength.

Hydraulical drives in machine tools were first used before the turn of the century but did not grow up to practical significance before 1920 according to a book *Hydraulic Drives for Machine Tools* edited by H. Krug and published by Julius Springer, Berlin. The author, who also included a history of hydraulically operated machine tools, covers the subject thoroughly, on about 250 pages illustrated with 162 figures and sketches.

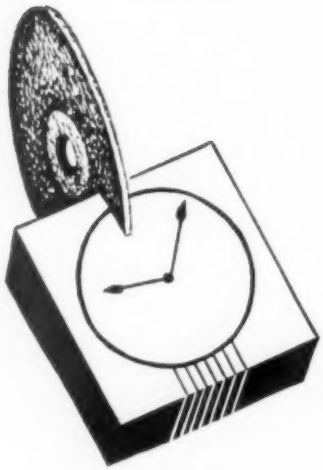


16"x1/8" Grade 211 Manhattan Cut-Off Wheels in use at Falls Metal Works, Little Falls, N.J.

Another Cost Study . . .

shows MANHATTAN CUT-OFF WHEELS

Cuts Hours and Dollars



Users at Falls Metal Works say, "Manhattan Cut-Off Wheels greatly reduce our costs of cutting on structural steel and bar stock. When you consider our work involves considerable miter cutting, these wheels are really doing an outstanding job for us".

This is no surprise to Manhattan engineers because they always custom-tailor the construction of Manhattan Cut-Off Wheels to the specific requirements of the work to be done. In effect, you get individualized wheels when you order Manhattan.

LET THE MANHATTAN ABRASIVE WHEEL DEPARTMENT HELP YOU CUT COSTS

Submit your problems and samples of work to Manhattan's laboratory. It is equipped for nearly every kind of abrasive cutting test.

GRINDING WHEEL INSTITUTE MEMBER

ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION

RAYBESTOS-MANHATTAN, INC. **PASSAIC, N. J.**

Mechanical Rubber Products • Rubber Covered Equipment • Abrasive and Diamond Wheels • Packings • Brake Linings
Brake Blocks • Clutch Facings • Radiator Hose • Fan Belts • Asbestos Textiles • Powdered Metal Products • Bowling Balls

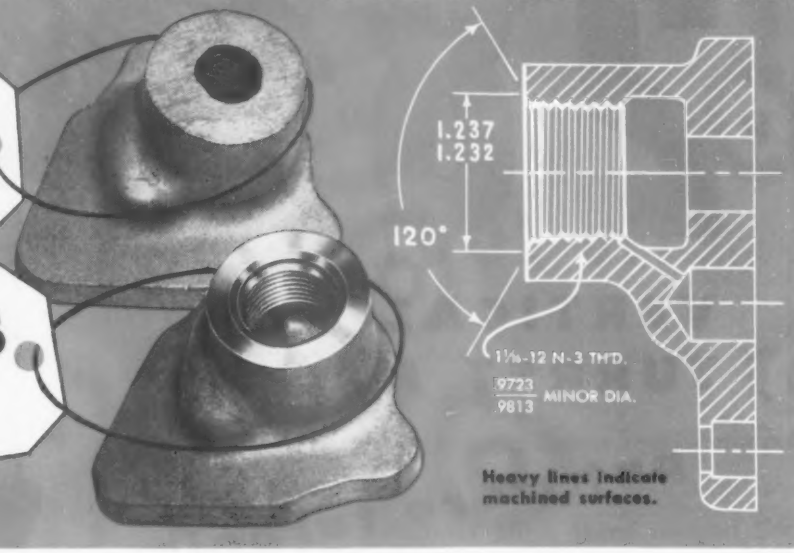
RM

THE P&J 3U AUTOMATIC

MACHINES THIS JOB IN RECORD FLOOR-TO-FLOOR TIME

RUSH

2 MINUTES FLAT



Five precision-operations are specified on these aluminum alloy Auxiliary Pump bodies for Jet Aircraft Engines.

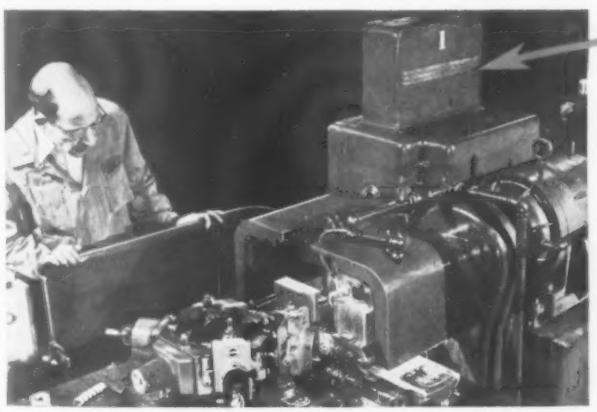
Producing this work to difficult "aircraft-quality" standards presented no problem to Chandler-Evans' tool engineers:

They simply tooled up a P&J 3U AUTOMATIC

— including a P&W Precision Ground Thread Tap and the P&J Automatic Tapping Control unit you see mounted on the top of the machine (a combination which easily maintains the required close tolerances for a Class 3 thread on a long production run)

— and machined these castings well within the unusually high-precision limits insisted upon by the Aircraft Industry

— in the record floor-to-floor time of 2 minutes flat!

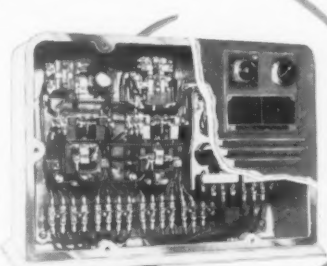


Operations

as indicated by heavy lines in the drawing:

1st — DRILL
2nd — FACE
3rd — BORE
4th — C'BORE, C'SINK
5th — TAP

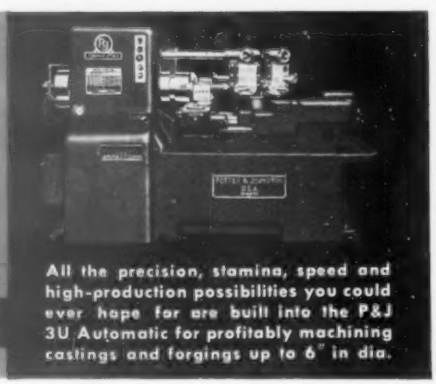
Production-tapping for Class 3 thread is accomplished by means of this P&J-designed Automatic Tapping Control Unit.



POTTER & JOHNSTON Co.

Subsidiary of PRATT & WHITNEY
Division NILES-BEMENT-POND COMPANY
PAWTUCKET, RHODE ISLAND, U.S.A.

Precision Production Tooling for 53 years

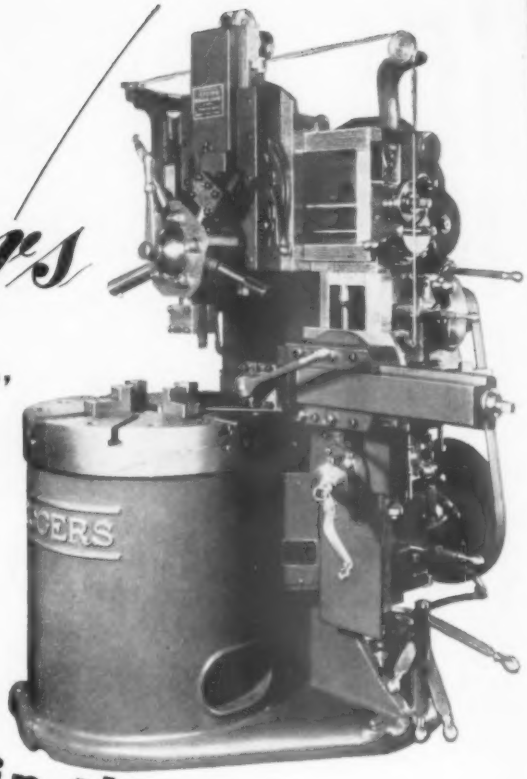


All the precision, stamina, speed and high-production possibilities you could ever hope for are built into the P&J 3U Automatic for profitably machining castings and forgings up to 6" in dia.

28 Rogers

"PERFECT 36"

VERTICAL TURRET MILLS



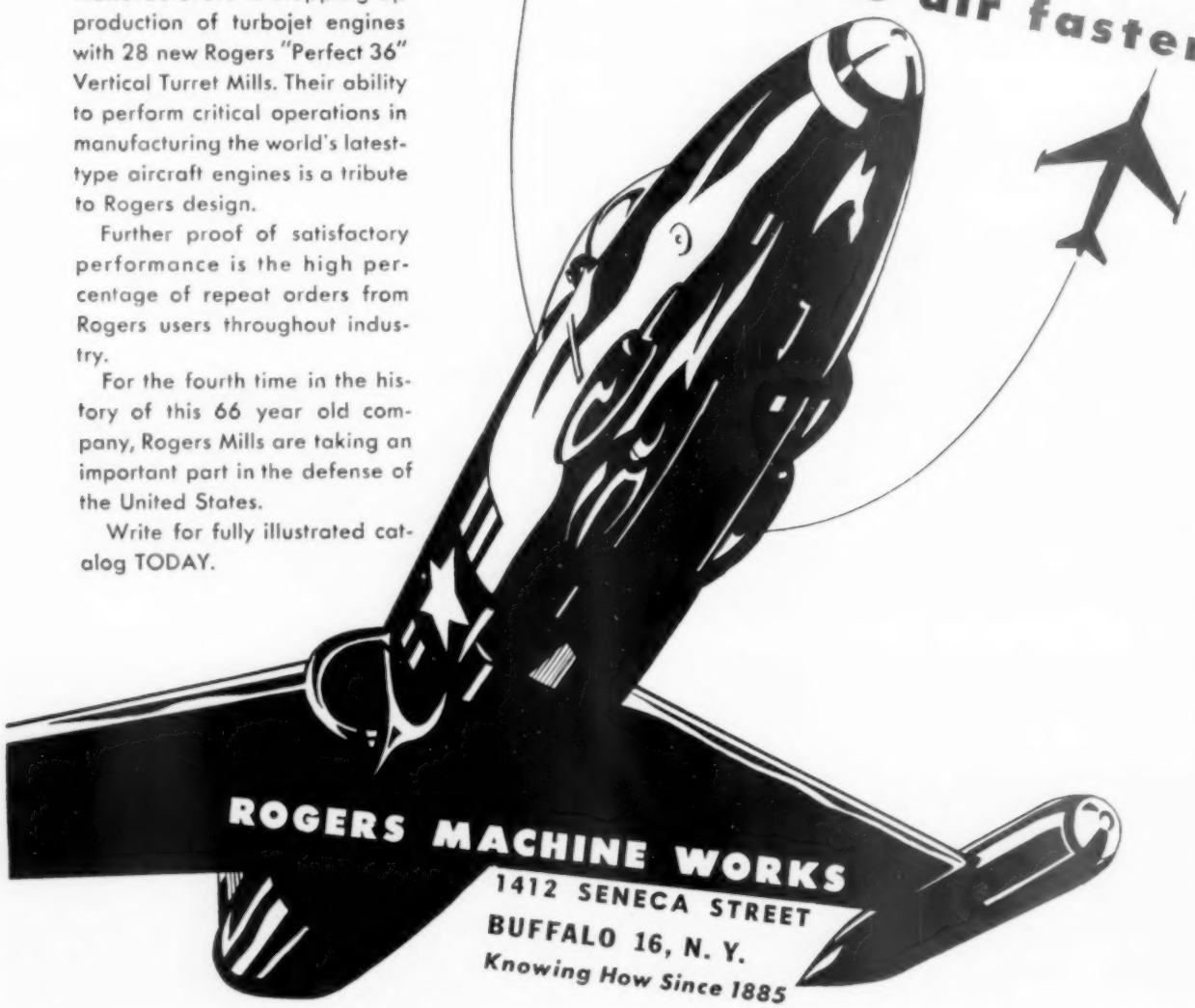
put more turbojets in the air faster

• One of America's foremost manufacturers is stepping up production of turbojet engines with 28 new Rogers "Perfect 36" Vertical Turret Mills. Their ability to perform critical operations in manufacturing the world's latest-type aircraft engines is a tribute to Rogers design.

Further proof of satisfactory performance is the high percentage of repeat orders from Rogers users throughout industry.

For the fourth time in the history of this 66 year old company, Rogers Mills are taking an important part in the defense of the United States.

Write for fully illustrated catalog TODAY.



ROGERS MACHINE WORKS
1412 SENECA STREET
BUFFALO 16, N. Y.
Knowing How Since 1885

Test proves you get

43% MORE PRODUCTION with MO-MAX TOOL BITS

IMMEDIATE DELIVERY FROM STOCK

On three operations in the set-up pictured here—machining nickel-moly steel (4615) at 135 to 150 s.f.m.—the superintendent kept careful records of tool performance. It was found that MO-MAX COBALT High Speed Ground Tool Bits ran *43% to 100% longer* that the tool bits previously used. In the break-down operation MO-MAX ran 4 hours, as compared with 2 hours for the other steel. In facing, it was 5 hours against 3½ hours. In cut-off, 4 against 2½. This is one of hundreds of tests in which both MO-MAX and MO-MAX COBALT Tool Bits have demonstrated their superiority. So if *you* have a difficult machining problem, a *Cleveland* Service Representative will be glad to give helpful suggestions. Contact our nearest Stockroom, or . . .

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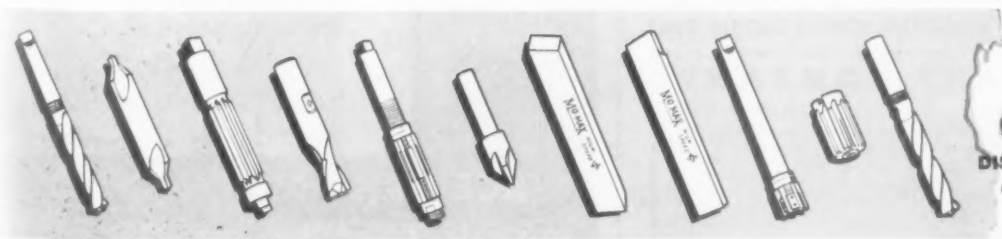


ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER *Cleveland* TOOLS

KICK "TOO-LITTLE-TOO-LATE" OUT OF OUR LIVES!

THE ABRASIVE PRODUCT
BAY STATE Koolpore Tool Room Grinding Wheels.

Keep your cutting tools in "fighting" condition. BAY STATE tool wheels manufactured with KOOLPORE specifications are ideally suited for sharpening broaches, cutters, reamers, end-mills, taps, hobs, counterbores, etc. They are ideal because of their extra cool, fast-cutting ability . . . a protection from excess heat that can ruin the edges of your valuable, hard-to-get cutting tools.

Ask for BAY STATE "on-the-spot" engineering help on your next abrasive job.

PHOTO COURTESY LAPOINTE MACHINE TOOL CO.

THE GRINDING JOB
BROACH SHARPENING. This type of broach is used in finishing the inside diameter of tank track links.

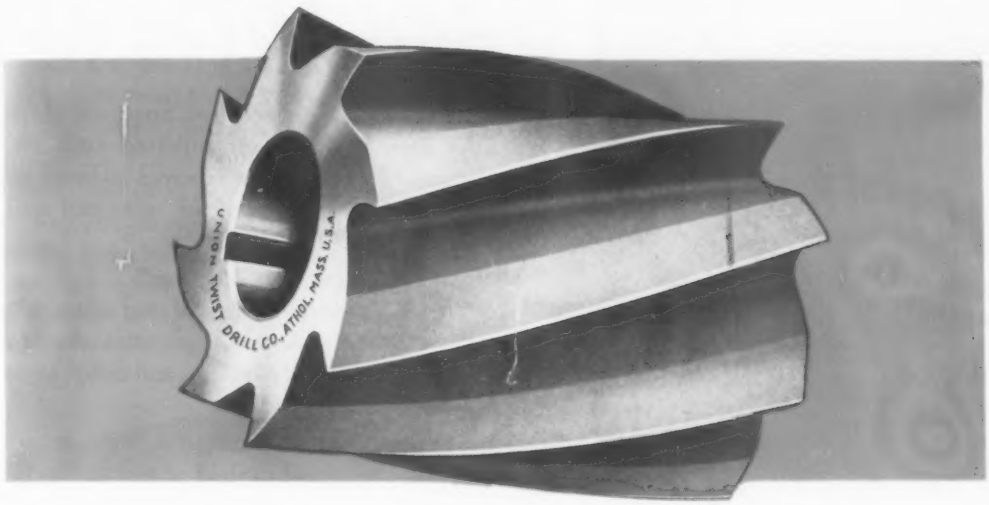
BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass.

Branch Offices and Warehouses — Chicago, Cleveland, Detroit, Pittsburgh
Distributors — All principal Cities
In Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ontario

BAY STATE ®

★ SECURITY COMES WITH STRENGTH ★

You cut downtime, increase output with UNION *Profile Cutters*



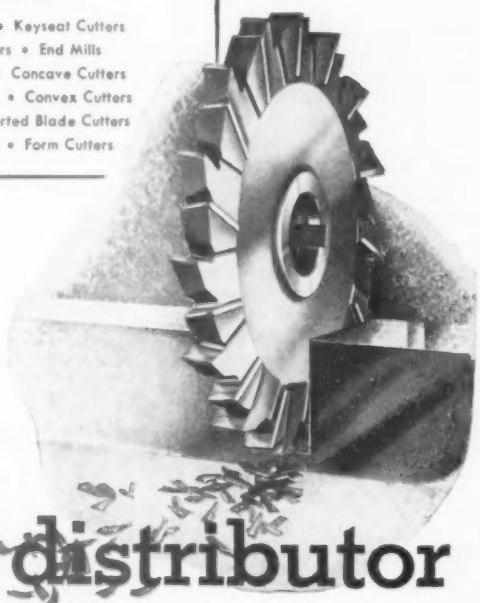
You can depend on a *minimum* downtime for reconditioning when you use Union high speed steel heavy duty profile cutters. Their undercut teeth have a special spiral angle that assures unusual efficiency and permits resharpening without rapid increase in width of land. Note the wide spacing, too. It allows ample chip room, and makes possible exceptionally strong teeth. Because there are fewer teeth in contact with the work, you also save on power.

Union profile cutters are performance proved. Rely on them for the toughest jobs in the shop. They work to closest tolerances, produce outstanding results from old or new machines. Available in 12 sizes ranging from 2½" to 4½" diameter.

A MILLING CUTTER FOR EVERY JOB

Whether you need special cutters built to your specifications or can use the standard Union cutters, there's a Union milling cutter to meet your needs. Following is a partial list —

Plain Milling Cutters • Keyseat Cutters
Helical Milling Cutters • End Mills
Metal Slitting Saws • Concave Cutters
Screw Slotting Cutters • Convex Cutters
Slitting Shears • Inserted Blade Cutters
Side Milling Cutters • Form Cutters



no other profile cutter will outperform a UNION

contact your local distributor

His name is listed in Union's THOMAS' REGISTER insert under "Drills, Twist".

UNION TWIST DRILL COMPANY, ATHOL, MASSACHUSETTS

Milling Cutters · Gear Cutters · Twist Drills · Hobs · Reamers · Carbide Tools

We own and operate S. W. CARD MANUFACTURING CO. Division, Mansfield, Mass. Taps, Dies, Screw Plates . . . BUTTERFIELD DIVISION, Derby Line, Vt., Taps, Dies, Screw Plates, Reamers . . . BUTTERFIELD DIVISION, Rock Island, Que., Milling Cutters, Twist Drills, Hobs, Reamers, Taps, Dies, Screw Plates.

"no more GAMBLING on tool steel selection"

[⅓ actual size; Selector is in 3 colors]

Since the first announcement, hundreds of tool steel users have received their CRUCIBLE TOOL STEEL SELECTORS. The comments received indicate that this handy method of *picking the right tool steel right from the start* is going over big.

"Handiest selector I've ever seen"

"No more gambling on tool steel selection"

"You're right, the application should dictate the choice of the tool steel" . . . and many, many more favorable comments.

You'll want your CRUCIBLE TOOL STEEL SELECTOR. It uses the only logical method of tool steel selection—begin with the application to pick the right steel! And the answer you get with one turn of the Selector dial will prove satisfactory in every case, for the CRUCIBLE TOOL STEEL SELECTOR covers 22 tool steels which fit 98% of all Tool Steel applications. ALL the tool steels on the Selector are in Warehouse Stock . . . that means when you get the answer, you can get the steel . . . fast!

Write for your Selector today! We want you to have it, because we know you've never seen anything that approaches your tool steel problems so simply and logically. Just fill out the coupon and mail. Act now! CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.

Here's how it works:

To use the Selector, all you need know is the characteristics that come with the job: type and condition of material to be worked, the number of pieces to be produced, the method of working, and the condition of the equipment to be used.

FOUR STEPS—and you've got the right answer!

1. Move arrow to major class covering application
2. Select sub-group which best fits application
3. Note major tool characteristics (under arrow) and other characteristics in cut-outs for each grade in sub-group
4. Select tool steel indicated

That's all there is to it!

Here's an example:

Application—Deep drawing die for steel

Major Class—Metal Forming—Cold

Sub-Group—Special Purpose

Tool Characteristics—Wear Resistance

Tool Steel—Airdi 150

One turn of the dial does it!

And you're sure you're right!!

Crucible Steel Company of America
Dept. T, Chrysler Building
New York 17, N. Y.

Gentlemen:

Sure! I want my CRUCIBLE TOOL STEEL SELECTOR!

Name_____ **Title**_____

Company_____

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City_____ **State**_____

CRUCIBLE first name in special purpose steels

TOOL STEELS

fifty years of Fine *steelmaking*

Branch Offices and Warehouses: ATLANTA • BALTIMORE • BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DENVER • DETROIT HOUSTON, TEXAS • INDIANAPOLIS • LOS ANGELES • MILWAUKEE • NEWARK • NEW HAVEN • NEW YORK • PHILADELPHIA • PITTSBURGH • PROVIDENCE ROCKFORD • SAN FRANCISCO • SEATTLE • SPRINGFIELD, MASS. • ST. LOUIS • SYRACUSE • TORONTO, ONT. • WASHINGTON, D. C.

first & finest!

Jones & Lamson Radial Chaser Die Heads

GROUND with THREAD CHASERS

These Die Heads will do an outstanding job on large or small lots, in pitches ranging from extremely fine to coarse multiple Acme.

They are versatile tools with an over-all capacity of from No. 8 to 4¼".

They require no more than the proper chasers to cut either right- or left-hand threads. No extra equipment is needed.

They are easy to install and simple to handle. For almost half a century J&L Dies and Chasers have been the answer to a multitude of threading jobs throughout the world.

Look at these features that make them leaders in their field and give you better threads at lower cost:

STRENGTH

Every part is of solid steel, hardened and precision ground. There are no built-up sections. Dependability and ultimate capacity are assured.

FLOAT

All models are built with both concentric and longitudinal float.

DUAL-DIAMETER CONTROL LEVER FOR ROUGHING AND FINISHING CUTS

Heavy rough cuts, followed by light, accurate finish cuts can be taken with the same set of chasers by merely moving the roughing attachment lever. This is often a chaser saver on heavy, coarse pitch jobs, especially where short chamfers are a requirement.

SIZE ADJUSTMENT

The external micrometer adjusting screw provides simple and precise setting to exact pitch diameter. It is easy to set and maintain sizes well within your thread tolerances.

RAPID CHASER CHANGE-OVER

Chasers are removed for resharpening, or size replacement, by merely removing the front cover of the Die. No tools are required. Change-over is a matter of seconds — which means more hours available for production.

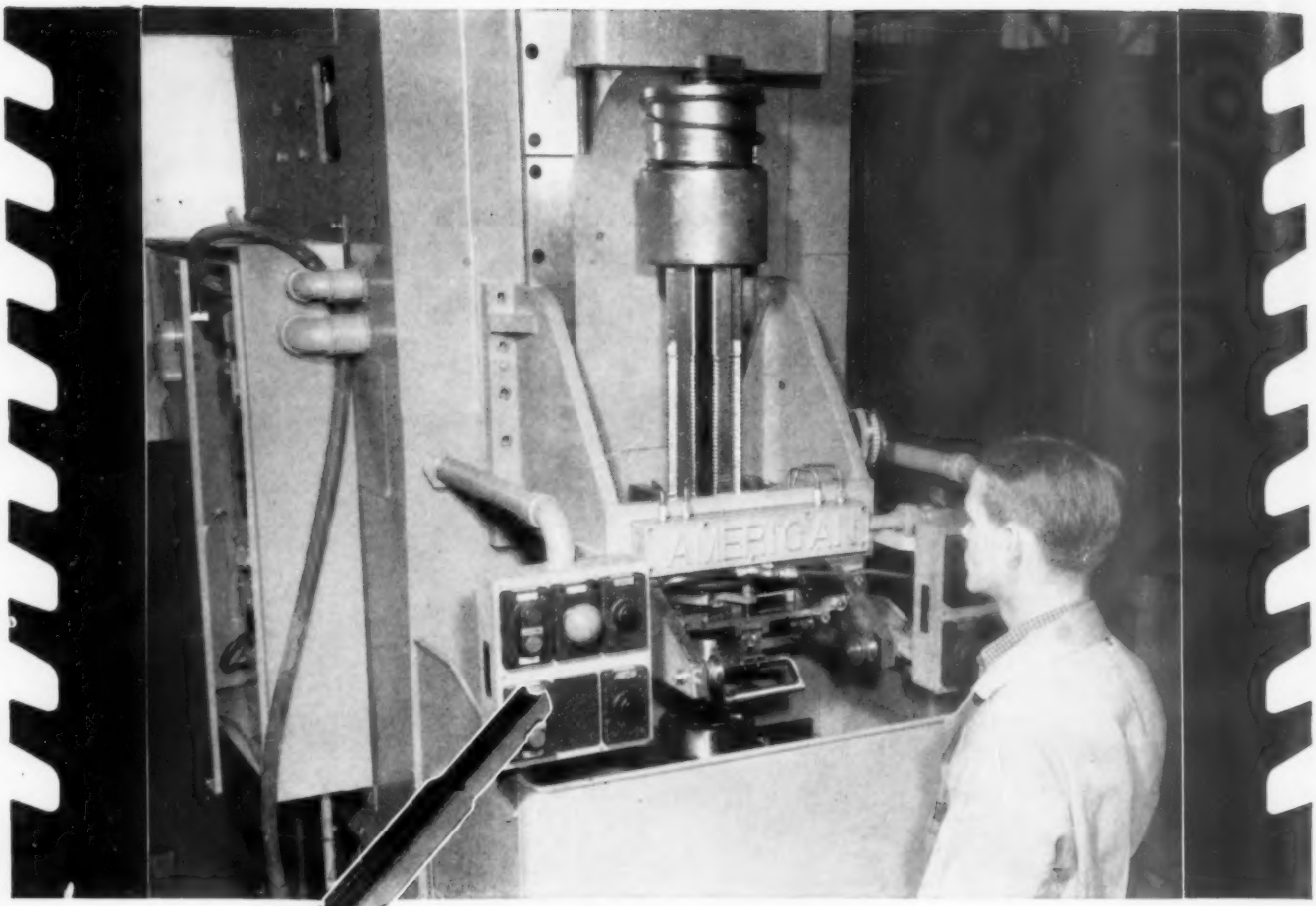
Write to Dept. 710 for illustrated catalog and complete information.

Thread Tool Division

JONES & LAMSON

MACHINE COMPANY
Springfield, Vermont, U.S.A.

Machine Tool Craftsmen Since 1835



ONE PASS *Broaches* SIX WINDOW OPENINGS

Typical result engineered the *American* way

A special, large, American-engineered, automatic, six station pull head, on a standard American VP 3-10-30 Vertical broaching machine, helps to speed production on this automatic transmission part. A total of twelve angular sides, plus twenty-four corner radii are finish broached on 150 of these steel forged parts per hour. The machine is equipped with an American-engineered fixture with a manually operated work slide interlocked with the machine cycle for maximum safety.

Developing jobs of this type is an everyday occurence at American Broach. Your broaching job benefits from the skill and experience of American engineers . . . engineers who design all three . . . broaches, broaching machines and broaching fixtures. Remember, the best way to do your job within cost and production requirements . . . is the American Way.

Write for our new Blue & Gold catalog containing complete machine specifications. Address Dept. T.

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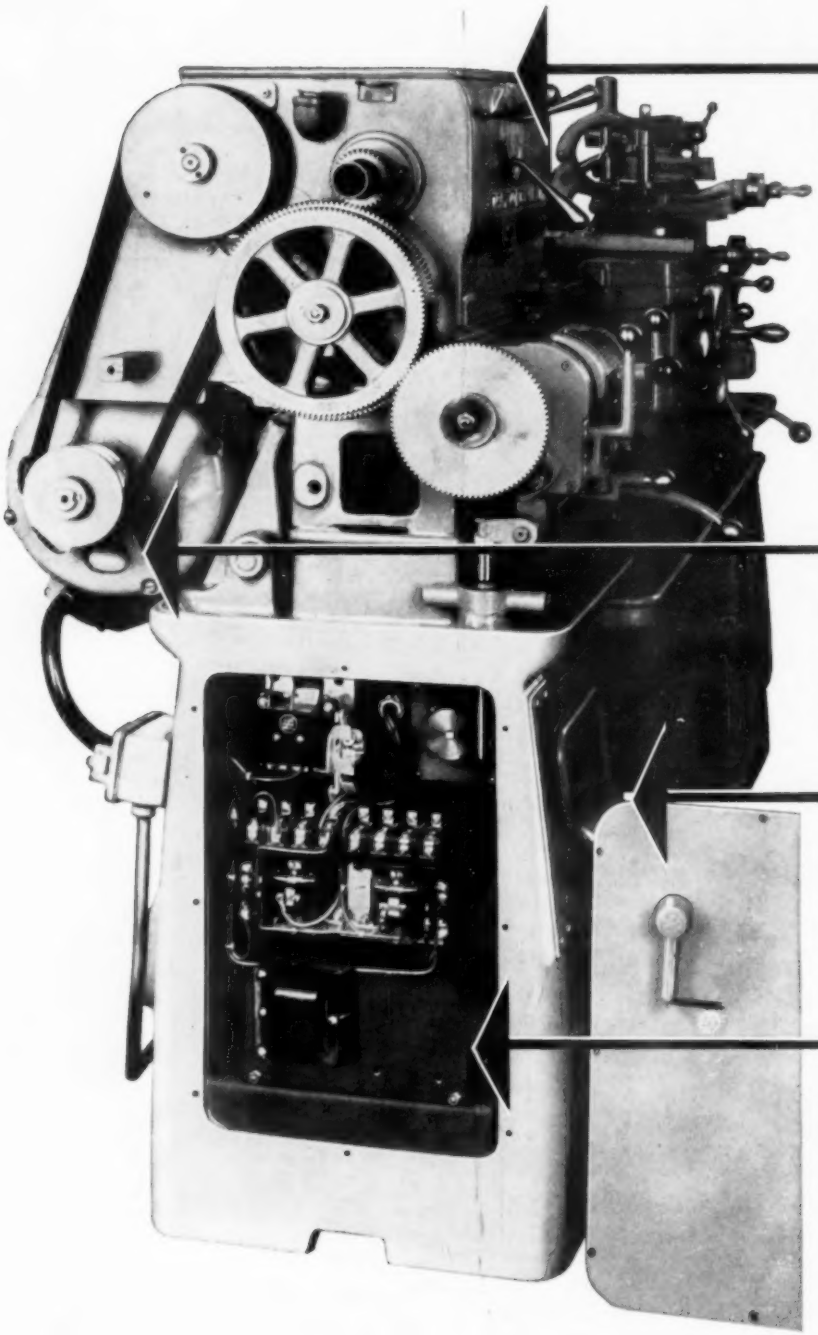
See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

pile it on a tray-top



tops for operator convenience

Tray-Top light duty engine lathe operators save many minutes per hour with mikes, tools, etc., parked on top of headstock and tailstock—right handy, safely off lathe ways and carriage. Direct reading color-match speed selector shifts instantly to any of 12 spindle speeds (all geared, 40 to 1 overall ratio) . . . When you pile work on Tray-Tops, maximum operator convenience pays off in more pieces per hour.

open air maintenance

Another important time and money saving advantage: Tray-Top motors are accessibly mounted thereby reducing down time for maintenance.

"cool" push buttons for safety

220 volts or higher power supply, when used, is stepped down to 110 volts at push buttons and drum switch for maximum operator safety.

blackboard simplicity in wiring

Totally enclosed electrical panel is a model of clean simplicity and safety. Access cover is locked with main disconnect switch. Panel must be dead when cover is off. Before you buy a light duty engine lathe, compare prices and get the whole picture of Tray-Top's outstanding values.

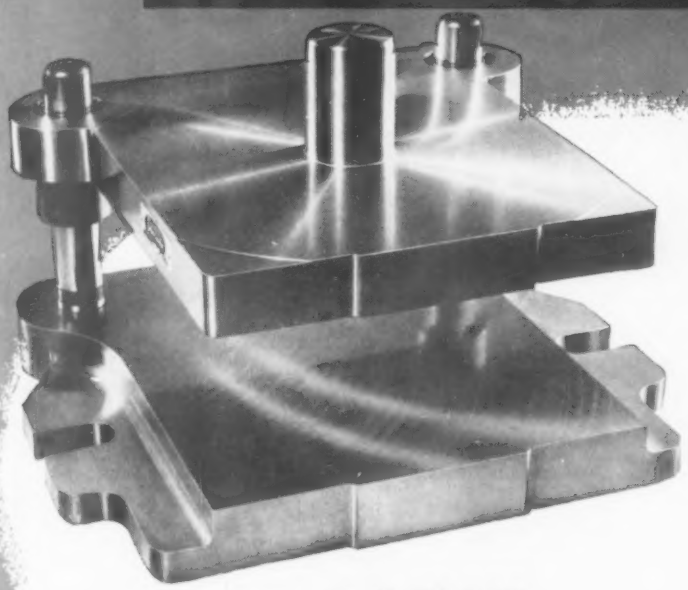
CINTILATHE

OF OUTSTANDING VALUE

CINCINNATI 9, OHIO, U. S. A. **cincinnati lathe & tool co.**

28 YEARS

OF PROVED PERFORMANCE



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PRECISION DIE SETS

DANLY
DIEMAKERS' SUPPLIES

More than 28 years of prompt, complete service has made Danly the first choice of diemakers everywhere.

Danly precision makes every Danly Die Set a reliable base for the finest die work . . . and every Danly Supply item a dependable time-saver.

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Operation Cycle Entirely Automatic
Positive Electrical Control
Exact Limitation of Feed Depth
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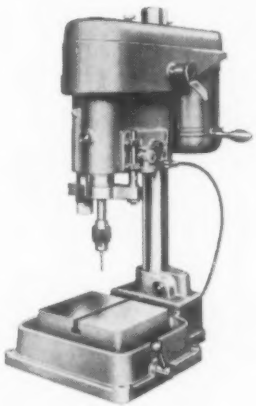
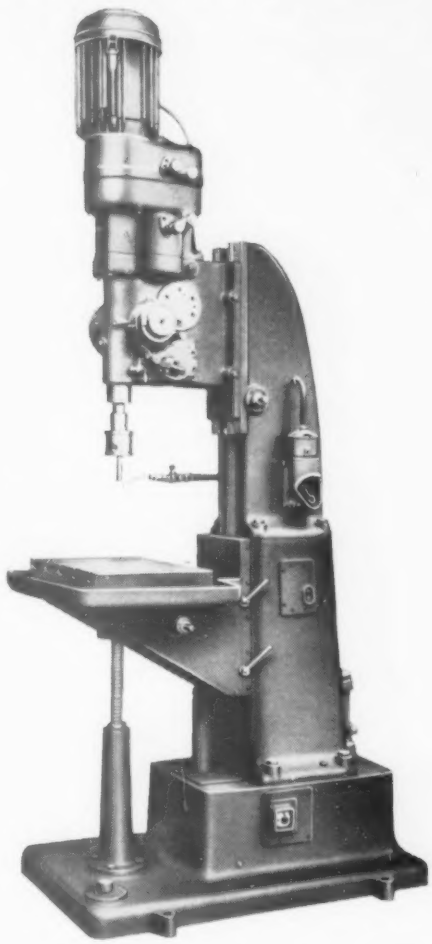
Cutting Capacity of High Speed Taps Fully Exploited
Spindle Fed At Pitch of Thread Being Cut
No Reversing Gears or Clutches
Simple to Operate
Very High Output



The Smallest: UG 0 For 5/32" max. dia. Thread



The Largest: UG 5 For 1 ½" max. dia. Thread

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At 30 Park Avenue, Manhasset, N.Y., (and at Hirschmann's Western Branch: 5124 Pacific Blvd., Los Angeles) is the widest selection of Swiss precision machine tools available from any one address in the United States. Offered here by Carl Hirschmann Co. are Tornos Screw Machines, and Cam Making Machinery; Schaublin Lathes, Collets, Milling Machines and Drilling and Tapping Machines; Lambert Gear Generating Machines and Thread Cutting Machines; Safag Automatics for Wheel and Pinion Cutting, Form Cutter Milling and Cutter Backing Off; and Agathon Grinders and Die Sets. Offered by Hauser Machine Tool Corp. are Hauser Jig Borers, Jig Grinders, Optical Measuring Machines, Profile Projectors and Burnishing Machines.

SWISS PRECISION CRAFTSMANSHIP SWISS DEPENDABILITY ACCURACY

Quick Changes

STROKES PER MINUTE
Simple shift levers change cutter-strokes-per-minute in seconds. 12 changes available.

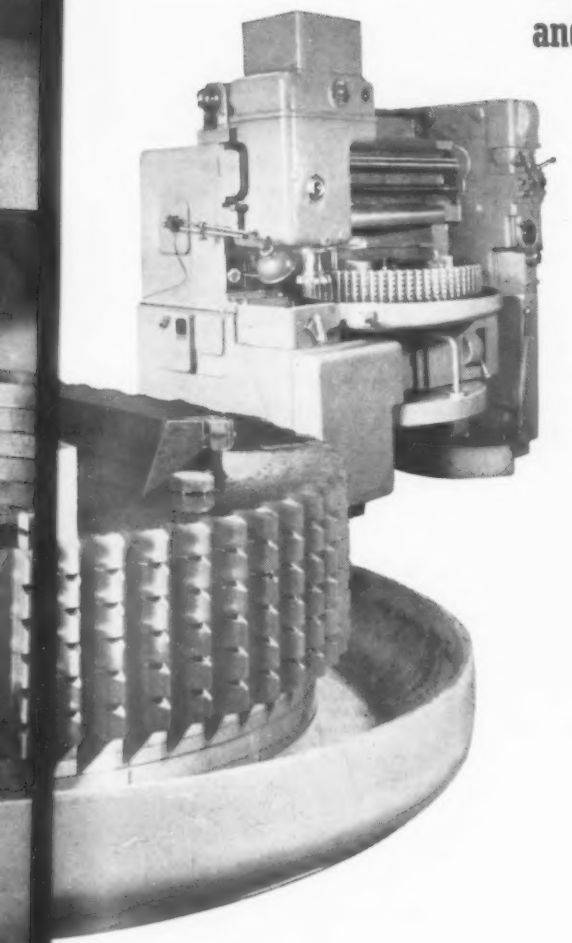
DEPTH OF CUT Dial control, graduated in thousandths, is as quickly adjusted, and locked in place.

ROTARY FEED A quick change gear-shift selection of 4 rotary feeds—with 8 (or more) additional feeds by changing two "pick-off" gears.

.in Feeds and Speeds

A SPUR TO TOP EFFICIENCY

On Short-Run Production the 36-Type Gear Shaper's 'Gear Shift' Controls make it simple and easy to rough and finish at maximum feeds and speeds.



The simplicity of control and operating convenience of the 36-Type Gear Shaper actually encourages record performance on different-sized blanks—as here pictured on sprocket cutting at Silent Hoist & Crane Company's Brooklyn (N.Y.) Plant. . . . All in all it takes no more than 25 seconds to change settings for (1) cutter strokes per minute (2) depth of cut and (3) rotary feed.

←Note how the blanks (for 7/8" roller chains) are stacked 6-high, to take advantage of the full 6 inch face width capacity of the 36-Type Gear Shaper. Typical feed and speed data for roughing and finishing cuts follows:

1.5" C. P. Sprockets	1st Roughing Cut		2nd Roughing Cut		Finishing Cut	
18.524" O. D.						
SAE 1040, 37 teeth,	Depth cut	.590"	Depth cut	.150"	Depth cut	.115"
7/8" face width,	Feed	.027"	Feed	.027"	Feed	.0408"
6 pieces per load	Strokes p.m.	41	Strokes p.m.	41	Strokes p.m.	50
32.867" O. D.						
SAE 1040, 67 teeth,	Depth cut	.590"	Depth cut	.150"	Depth cut	.130"
29/32" face width	Feed	.021"	Feed	.021"	Feed	.021"
6 pieces per load	Strokes p.m.	41	Strokes p.m.	41	Strokes p.m.	41

The same advantage in quick flexibility of control applies irrespective of the diameter and pitch of the work—with the same overall advantages of low production costs and cutter economy. . . . Precision quality of the work done can be held to any desired limits.

It's time to modernize! Your requirements in heavy duty gear cutting will profit by early investigation of the 36-Type Fellows Gear Shaper. For a catalog or a call, get in touch with the nearest Fellows Office.

Fellows

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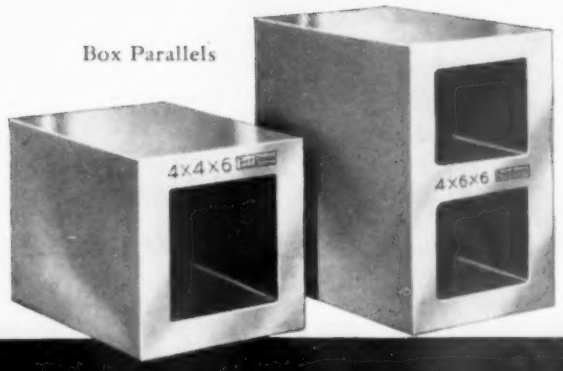

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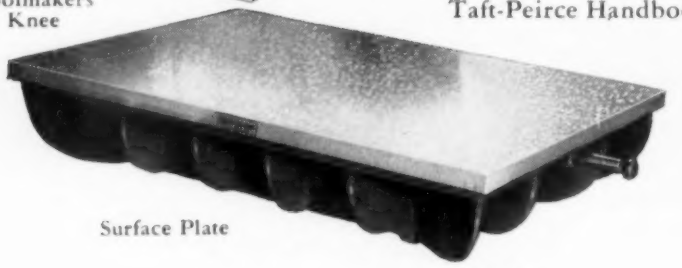

Surface Plate

The TAFT-PEIRCE Manufacturing Company

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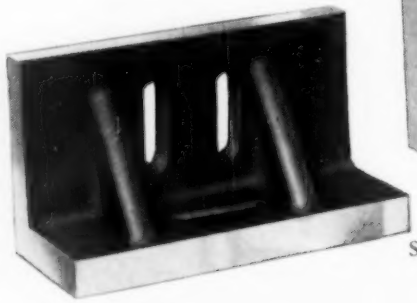
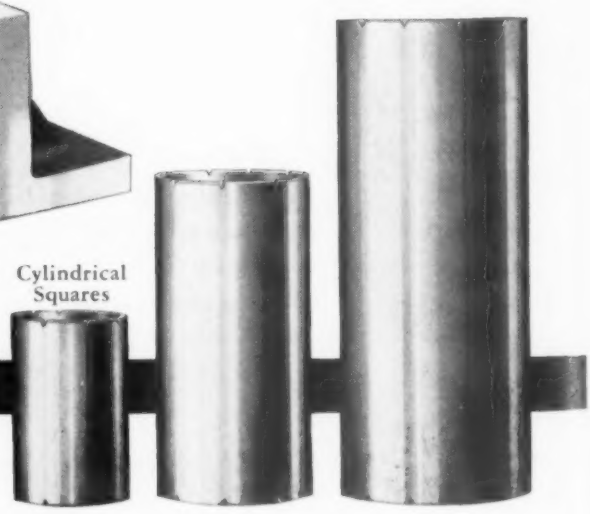


Slotted Angle Irons



Cylindrical Squares

TP means TOP PRECISION

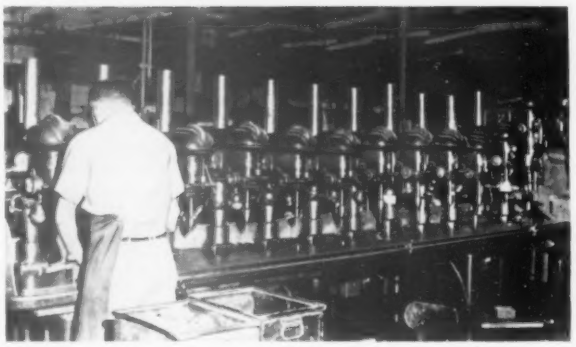
3 Simple "Moves" Show How VERSATILE DELTA TOOLS Solve Production Problems...

1 MOVE THE OPERATOR

To make it easy for the operators of a long-table multiple spindle Delta drill press to move from one work station to another, Albertson and Company, Sioux City, Iowa, devised roller seats that travel on rails. When one man completes his series of operations he passes the work to the next man. Operators can travel the full length of the table with a minimum of fatigue.

2 MOVE THE TOOL

To make easier work of drilling holes in a large, extremely heavy bath-tub casting, Racine Pattern Works, Racine, Wisconsin, mounted a Delta 17-inch drill press on a three-legged spider base, in place of the regular base. Now the casting remains stationary, and it is an easy, simple operation to slide the drill press into several positions for drilling holes in the flange of the casting.



3 MOVE THE WORK

To speed up eleven operations on an aluminum grid casting—including drilling, reaming, counterboring, countersinking—Sangamo Electric Co., Springfield, Ill., uses a Delta 15-foot sectional table and eleven Delta 17-inch drill presses for the individual operations. The casting moves from one machine to the next; and a great deal of costly trucking and handling is eliminated.

These applications are typical of the cost-cutting set-ups devised by Delta users; and illustrate the extraordinary adaptability of Delta tools to unusual production needs.

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53 MACHINES—246 MODELS—MORE THAN 1300 ACCESSORIES

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When it comes to production- come to Hartford Special

This part has

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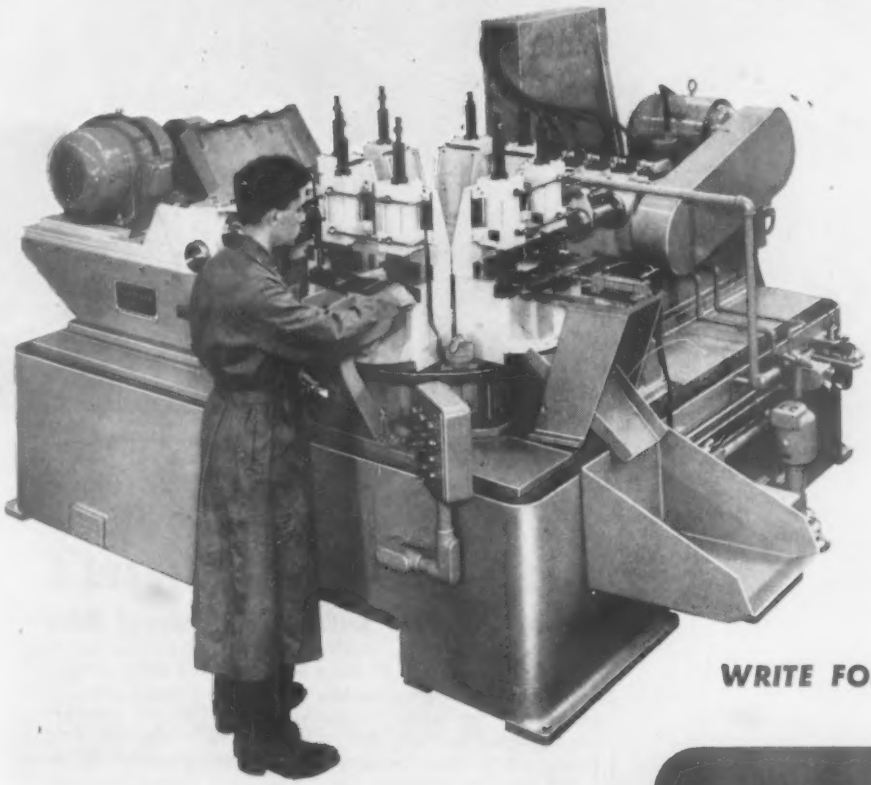
hollow milled from square section and threaded

on this HARTFORD SPECIAL

AUTOMATIC DRILLING & TAPPING MACHINE



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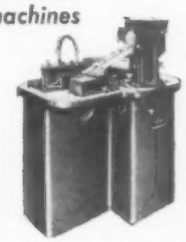
Hartford Special also makes these production machines

SUPER-SPACERS



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...the best buy in the long run

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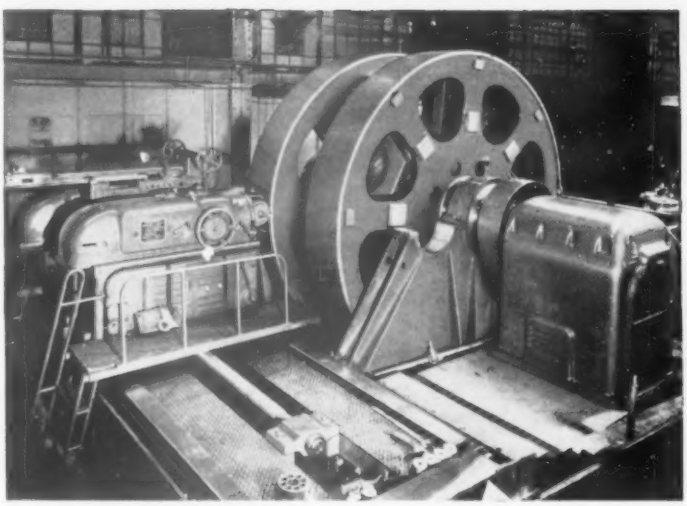
Precision Shaved Gears to Drive the..... SS UNITED STATES

The largest, fastest, most luxurious ocean liner ever built in this country is an outstanding example of American know-how and initiative. Built by the Newport News Shipbuilding and Dry Dock Co., she carries the products of every state in the Union, including the finest mechanical equipment American industry can produce.

Among the important mechanical elements of the ship's propulsion machinery are the mammoth reduction gears made by Westinghouse Electric Corporation. To achieve the perfection of tooth surface required in these gears, they were finished on Red Ring Gear Shaving Machines.

These machines are built to shave gears of any size—from the smallest instrument gear to the largest marine gear.



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REPLACE CARBIDE TOOL TIPS QUICKLY AT LOW COST

NEW TIP-BRAZING UNIT IDEAL FOR METAL WORKING SHOPS

Now — a safe, easy, economical way to braze carbide tool tips on tool shanks. This new tip-brazing unit is a low-cost investment for any shop and will soon pay for itself. Many already in use with proven successful results.

REQUIRES MINIMUM TIME

Tips are removed and replaced on 1½" by 1" tools in as little as 2½ minutes over-all. All elements are adjustable.

ECONOMICAL TO OPERATE

Uses 75 lbs. compressed air in combination with manufactured or natural gas at regular city pressure. No expensive electrical controls required. No complicated equipment to service or maintain.

GREATER ACCURACY

Refractory-cup radiant gas burners, supported by adjustable clamps, can be faced to within ¼ to ½ inch of tool shank.

SAFE, FOOLPROOF METHOD

No "blasting" over the tool because velocity of burning gases is largely dissipated within burner cup. No danger of flux being blown off at tool end before brazing is completed. Less inclination toward oxidation than other methods.

ATTRACTIVE — RUGGED — COMPACT

Modern, streamlined appearance. Requires only five feet of floor space. Sturdy construction to provide long, constant use.

EASY TO OPERATE

Few moving parts and simple operation make it easy for any workman to do the job without special training. Tool tips are easy to get at.

VERSATILE

Unit also ideal for annealing welding tools and heat treatment of small parts. A small oven can easily be adapted to the unit. Higher temperature bronze bond can be used rather than silver solder.

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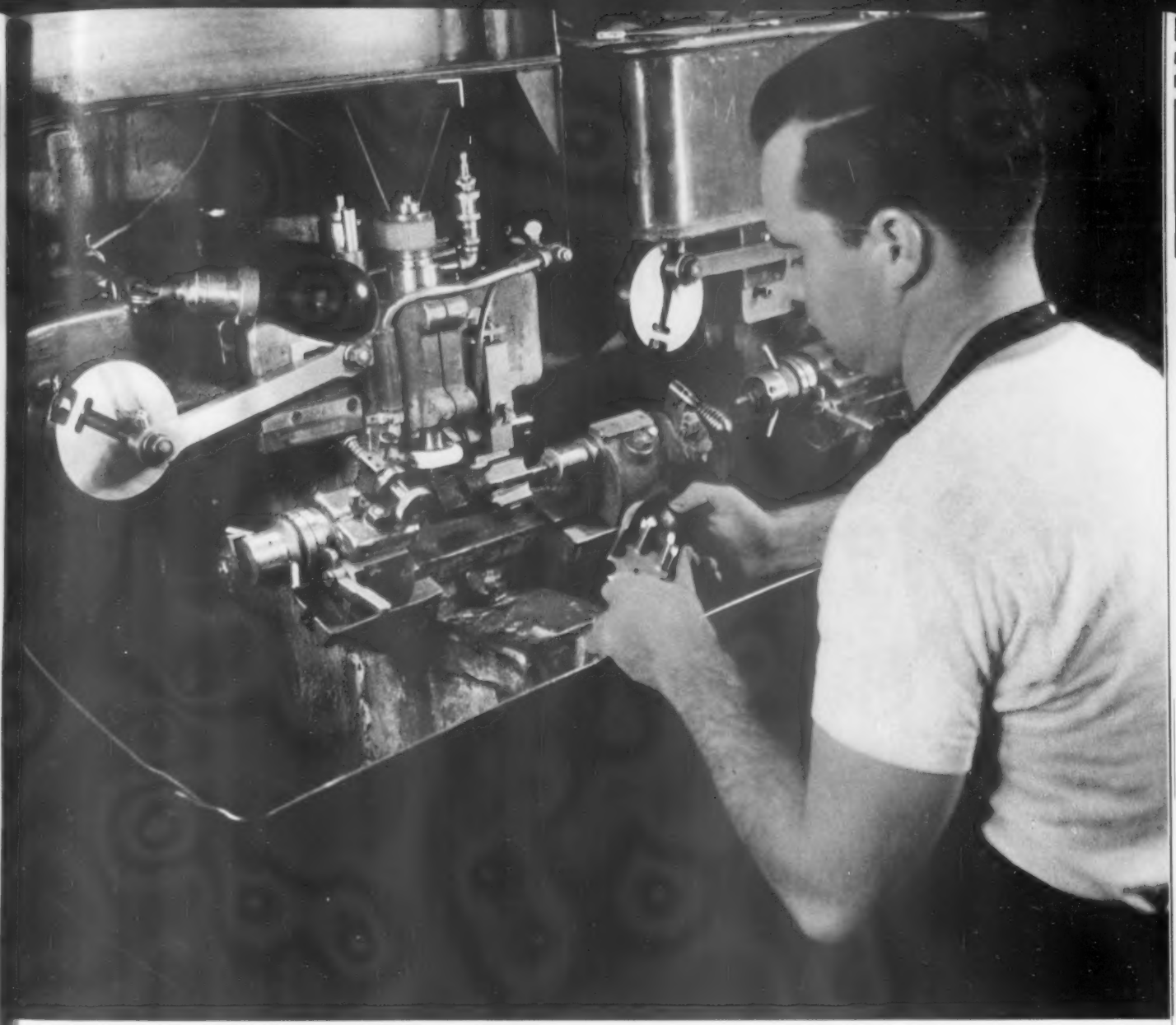

Machine Ground Tap Flutes

Grinding Tap flutes is not just another operation to improve their appearance. Like Greenfield's precision automatic chamfering, this machine grinding operation imparts one more feature that makes "Greenfield" Taps TOPS.

Why? Because it assures accurate spacing and uniform cutting faces down to the very end of the tap. And the ground flute surfaces provide better chip slippage and disposal.

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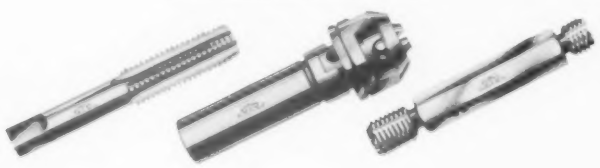

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The Geometric people say this type head works swell on this new equipment. Their field engineer will be in to look over the whole installation if you want him.
Sure is compact and rugged looking.
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ARE STANDARD ON THIS 170-TON EXTRUSION PRESS

Because ease of assembly, strength and neatness were important factors in the production of this special oil-operated lead extrusion press, "Robertson" specified UNBRAKO Knurled Head Cap Screws.

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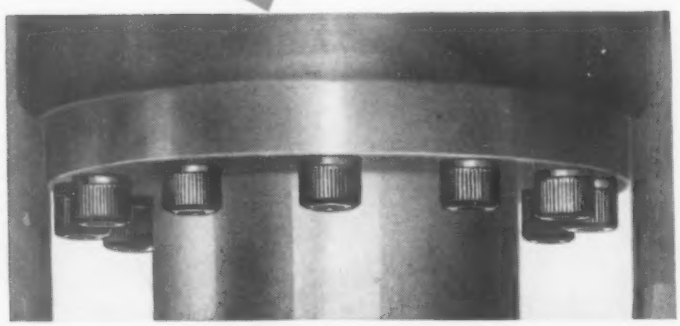

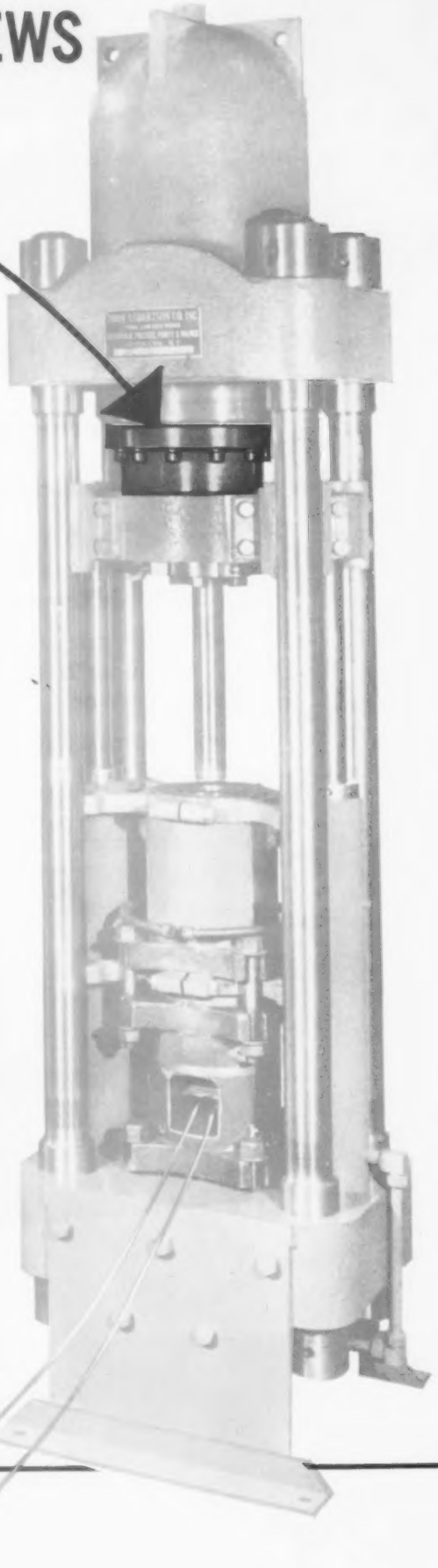

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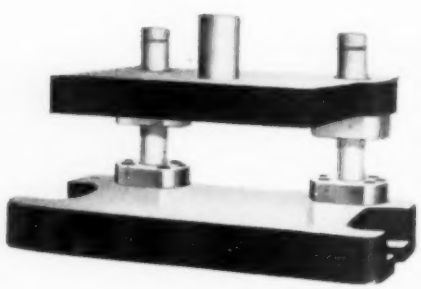
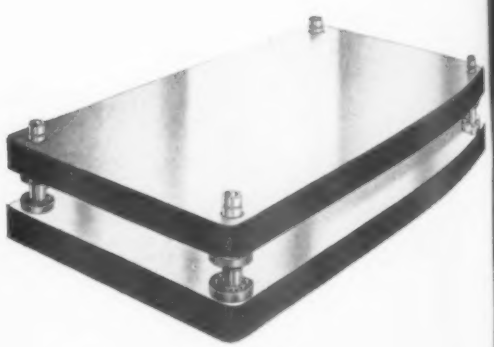
Our new catalog showing hundreds of sizes and styles of die sets, plus a complete line of stamping accessories is now ready. Write for your copy today.





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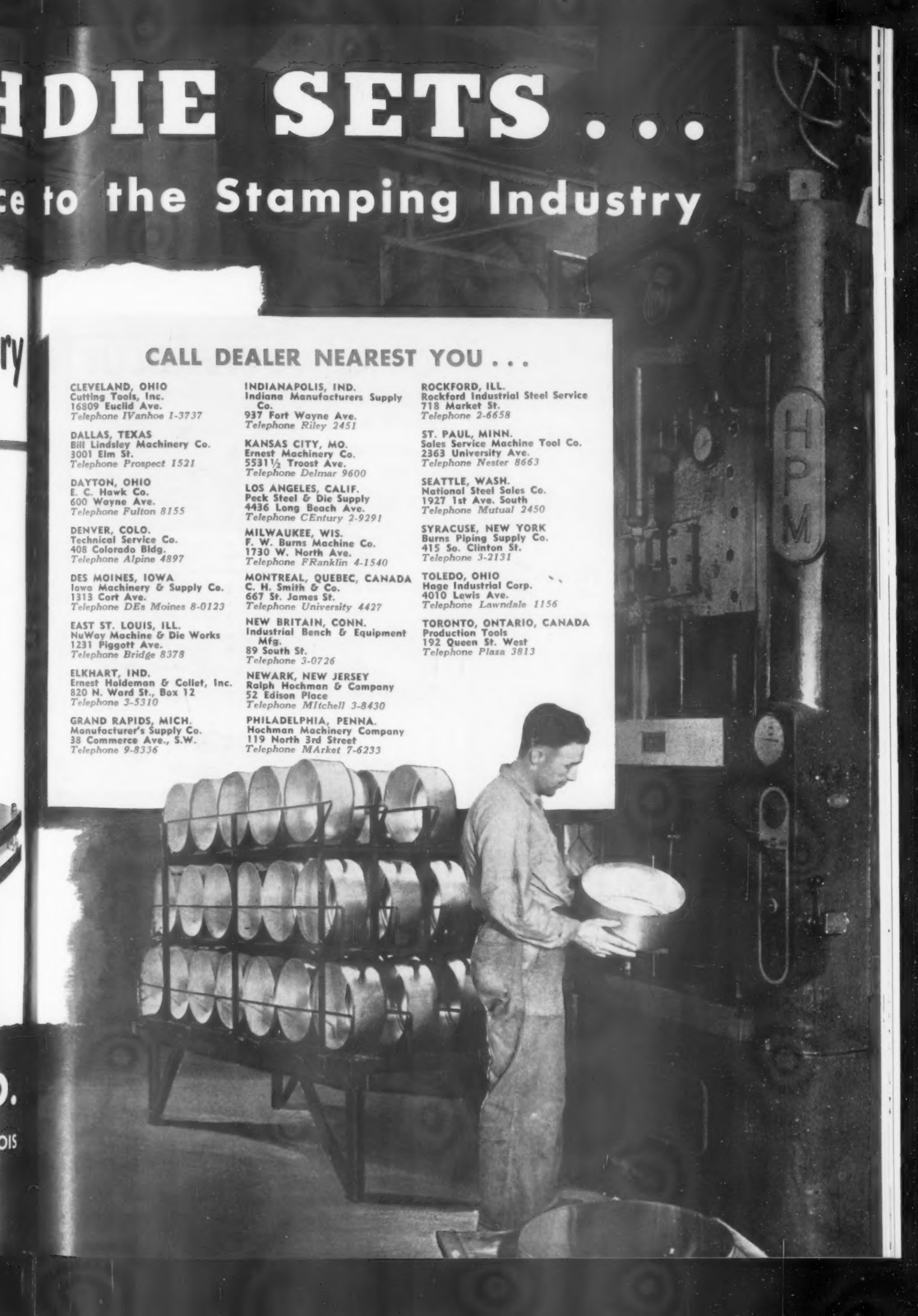

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This new FREE booklet tells how two new types of Oakite-developed solvent detergents make it easier and cheaper for you to do many difficult metal-cleaning jobs. Here are some of the subjects covered in the booklet:

Cleaning metal between processing operations
Precleaning before painting or plating
Stripping paint
Providing temporary protection against rust
How to use Oakite solvent detergents:

Spray-washing machine method — **Spray-rinse method**
Soak-tank method — **Manual method**

FREE For a copy of this 24-page booklet (illustrated with photographs and diagrams), write Oakite Products, Inc., 58 Thames St., New York 6, N. Y.

Technical Service Representatives in Principal Cities of U. S. & Canada

OAKITE SPECIALIZED INDUSTRIAL CLEANING MATERIALS • METHODS • SERVICE

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IMMEDIATE DELIVERY!

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21—30	5⅜	.80
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⅛" to ½" H.S. 12" long S.S. Drills; 17/32" to 31/32" H.S. 15" long T.S. Drills; 1" to 1¼" H.S. 20" long T.S. Drills also available.

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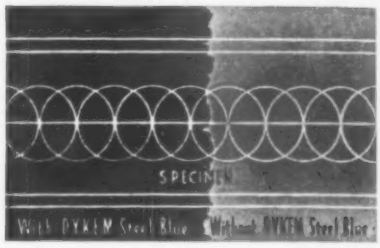
STOPS LOSSES

making dies & templates



Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout show up in sharp relief and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information

THE DYKEM COMPANY, 2303D North 11th St., St. Louis 6, Mo.

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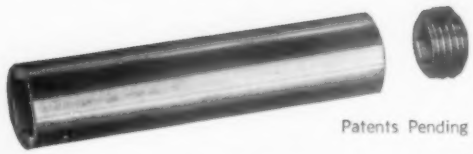
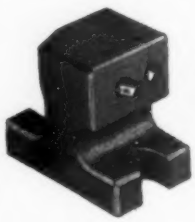
How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!



Patents Pending

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.



The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

BUSHINGS MADE IN FOLLOWING SIZES:
3/16, ¼, 5/16, ⅜, 7/16, ½, ⅝, ¾, 1"

•

STURDY BROACHING SERVICE
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Write for Literature

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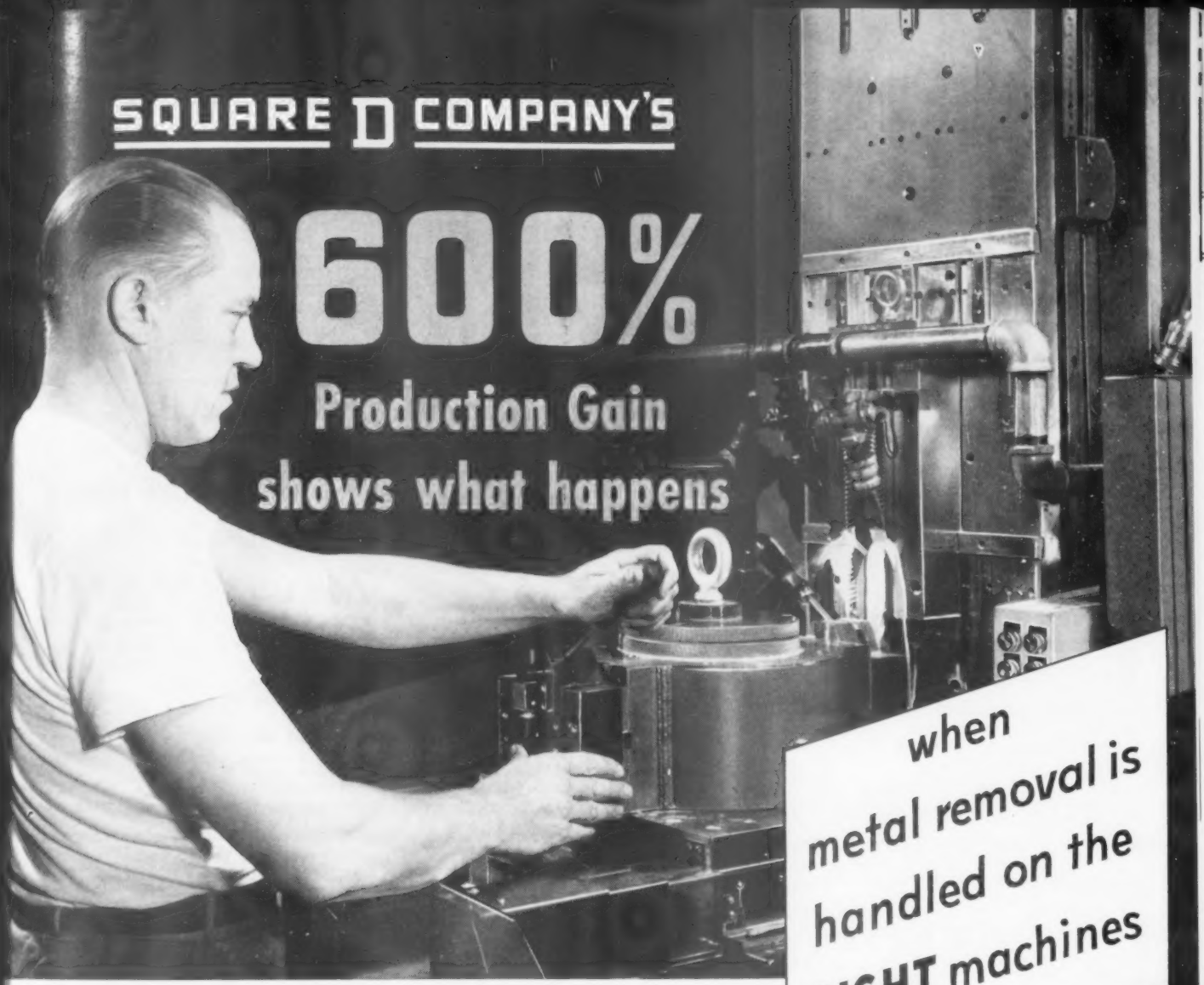


SQUARE D COMPANY'S 600% Production Gain shows what happens when metal removal is handled on the RIGHT machines

Up until the time the Square D Company, control manufacturer of Milwaukee, turned to Oilgear Fluid Power Broaching for the preparation of soft iron armature and magnet frame parts for motor control, the company had been milling, grinding and deburring these parts, and its best rate was 75 pieces per hour.

What happened when Square D turned to Oilgear Fluid Power Broaching

The first thing that happened when the Square D Company turned to Oilgear Fluid Power Broaching was that on a *one pass* operation, it got a finer finish at closer tolerances on the completed part. The second thing was that instead of three separate operations, it had only *one* operation. The third thing was that it got 350 pieces per hour at once. The fourth thing was that with a minor fixture redesign production soared above 525 pieces per hour.

Can you expect such production increases if you change to the right machines?

If the best Oilgear Fluid Power Broaching offered you was a gain of a few pieces per hour, doubt about the advantages of Oilgear might be reasonable. Even if a 600% increase was only an isolated instance, hesitation might still be justified. But when . . . *AS A RULE* . . . Oilgear Broaching immediately results in a disproportionately large production increase, with better finish and closer tolerances then there can be only one conclusion.

If in any of your operations you remove metal from a part which can be broached, or even material from hard rubber stock for example . . . and if you are not handling the work by broaching, then it is high time you really get to the bottom of Oilgear Fluid Power Broaching. Really *investigate* it. You may be due for one of the pleasantest and most profitable surprises of your business career.

THE OILGEAR COMPANY
1573 W. Pierce Street, Milwaukee 4, Wisconsin

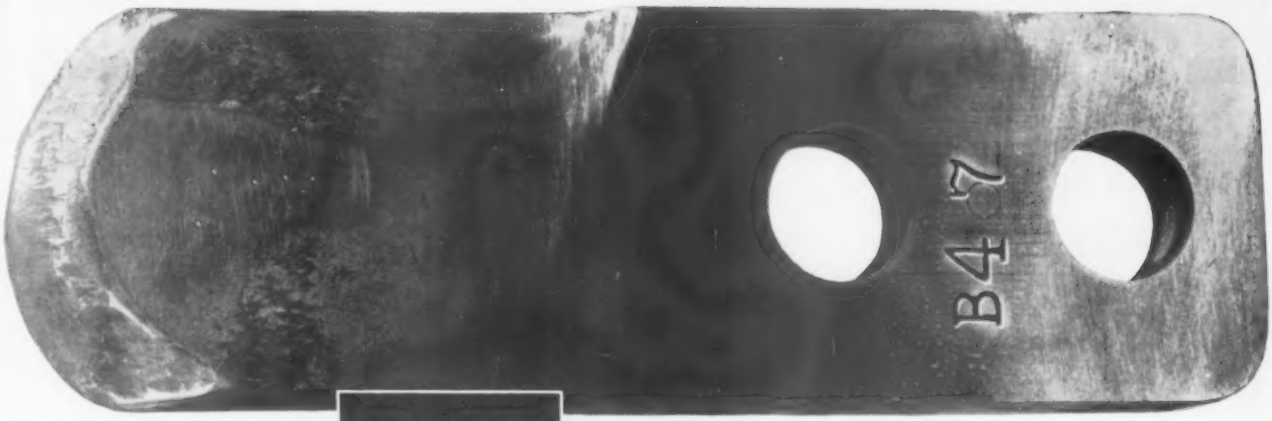
Details of Square D Broaching Operations

Parts broached: Laminated armature and magnet frame assemblies used in Square D magnetic starters. Material is soft iron which tears and burrs easily. Previous handling: milling, grinding and deburring. Best production, 75 pieces per hour.

Oilgear Broaching produces far better finish, requires no deburring, requires one operation instead of three. Ten different sizes and shapes of assemblies are accommodated on two sets of fixtures. Production is better than 600 pieces per hour.

Broaching operation is continuous and automatic with minimum fatigue to operator who sits or stands at work. Operator merely unclamps and removes broached part, loads and clamps rough part.

OILGEAR *Fluid Power Broaching*
. . . The RIGHT Machines



This punch gave double service!

This block had double life!

This die lasted 50% longer!

B-47 HOT WORK STEEL

gives you more runs for your money

. . . anywhere from ***1½*** *to* ***5*** *times the Performance!*

SOME TYPICAL EXAMPLES

B-47 dummy blocks, vs. 9% and 12% tungsten types, extruded more than twice as many brass and copper tubes. B-47 dies outperformed 12% tungsten type 1½ to 1.

B-47 punches, vs. low-carbon 18-4-1 type, hot pierced more than twice as many eyes in steel axes. See top picture.

B-47 die inserts, vs. 9% tungsten types, hot pressed more than twice as many steel side gear forgings. B-47 die inserts, vs. regular insert material, performed better than 5 to 1.

B-47 dummy blocks, vs. 5% tungsten-5% chromium types, extruded twice as many copper and brass tubes and rods. B-47 dies outperformed 12% tungsten-12% chromium type.

B-47 punches, vs. 5% chromium type, hot extrusion forged 1½ times as many automotive steel front axle spindles.

B-47 die inserts, vs. 9% tungsten types, extruded 1½ times as many high alloy steel automotive valves. This is considered a very difficult job for any grade of hot work steel.

SEND NOW

for "Blue Sheet" on Grade B-47

This four-page folder gives technical data on B-47 for brass extrusion dummy block and dies, valve extrusion die inserts, hot punch tools, forging die inserts, press forging dies, and hot work in general. *Write for your copy today.*

ADDRESS DEPT. TE-24

Looking for a better hot work steel? You'll find it in B-47—an improved chromium, tungsten, cobalt, vanadium type whose superiority is established by actual performance runs such as those summarized above. All tests show that B-47 has unusual resistance to shock and abrasion at elevated temperatures.

Developed originally for applications in the copper and brass industry, B-47 has given excellent results on difficult hot work jobs on steel. B-47, when properly heat treated, exhibits a well rounded combination of red hardness, toughness, and resistance to wear and heat checking that makes it a valuable addition to the Allegheny Ludlum group of hot die steels.

Put B-47 to the test. You'll find that it will do any number of severe hot work jobs without washing out or changing size. Get in touch with A-L, today. Let us help you to use B-47.

● *Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.*

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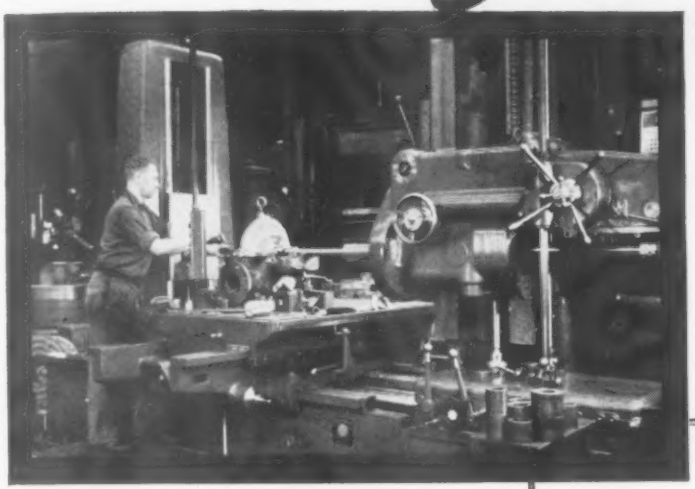
Allegheny Ludlum

WAD 3530

AL FINE TOOL STEELS SINCE 1854

Fine Machine Work

"Decides the Quality of a Pump"



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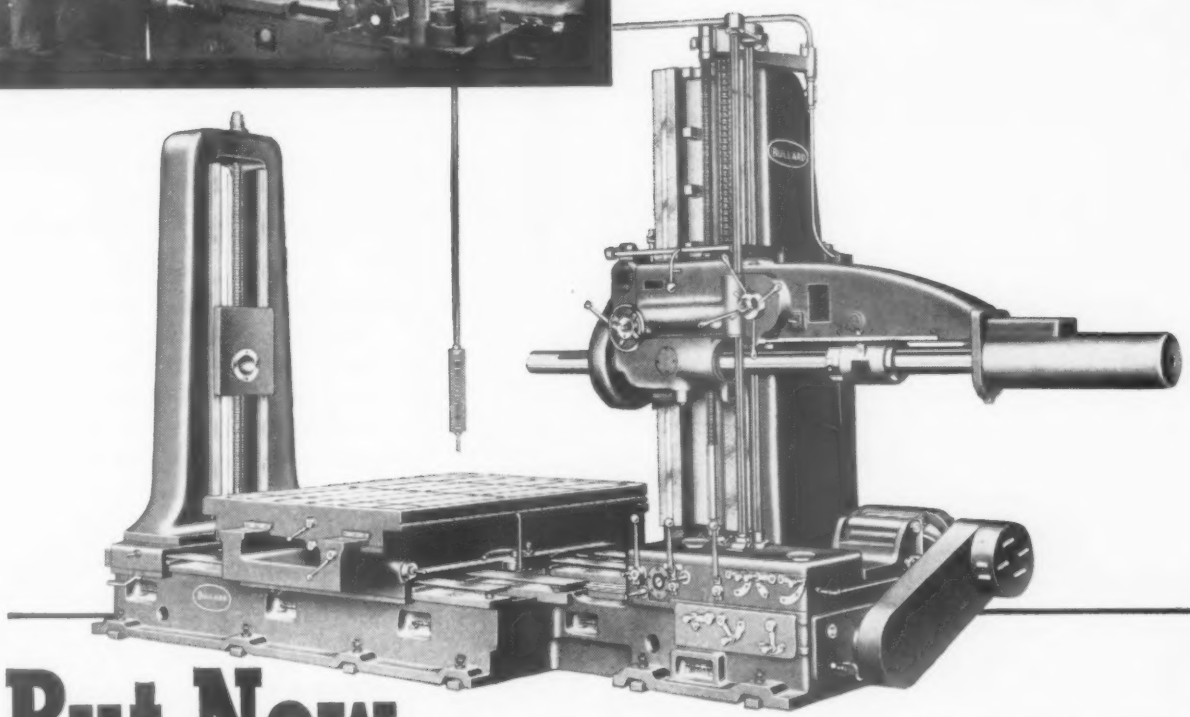
Warren Steam Pump Co.
of Warren, Mass.

testimonial enough
for their five

Universal
Boring Machines



But Now... Universal Redesigned by Bullard offers a broad 4-way bed Horizontal Boring, Milling and Drilling machine with an even Higher Degree of Rigidity, Accuracy and Serviceability.

Call in a Bullard Engineer or write for complete details describing the many points of Redesign and Modernizing.

Bullardize your plant for Higher Efficiency.

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BRIDGEPORT 2, CONNECTICUT

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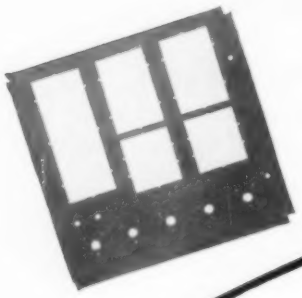

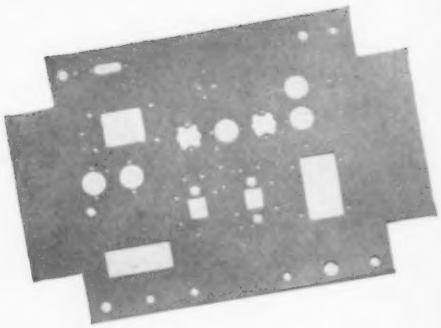

SEE WIEDEMANN

Bulletin 241 describes the most efficient method of producing chassis and similar work in short runs and semi-production runs. Repeat runs of 5 to 1,500 pieces and single runs of 50 to 5,000 pieces are economically produced on the Wiedemann RA-41P. Write today for bulletin 241.

THE WIEDEMANN METHOD permits you to: (1) Keep up with engineering changes without materially affecting production schedule; (2) Keep tool inventory low; (3) Produce quantities in accordance with sales requirements; (4) Produce accurate work with inexpensive tools.

"THE WIEDEMANN METHOD" through the elimination of expensive punch and die set-up and work location methods, provides an efficient means of piercing single pieces, and semi-production runs, regardless of repeat frequency.

Machines available for piercing sheet and plate up to ½" thick, up to 120" wide x 200" long.

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o easier, more accurate filing:

Guide the Work Instead of the File
—Cut all of the Time

Top: Internal filing easily done on thick, thin or irregular shapes.

Bottom: Remove flash, irregularities from castings, forgings, etc., quicker at less cost.

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DoALL precision file bands are available for immediate delivery—Get the right type for every job. For cutting aluminum, brass, cast iron, copper, zinc, steel and non-ferrous metals DoALL file bands come in flat, oval and half round sizes of ¼", ⅜", ½".

Check these DoALL Precision Band Filing Features that handle all External and Internal Filing Jobs

1. 4 times faster than jig filing. 9 times faster than hand filing.
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3. No lost motion. Not a reciprocal, DoALL continuous filing cuts all of the time.
4. Up to 50% more cutting efficiency.
5. Cuts file costs, unit costs, gives more production.
6. Job Selector on the machine gives correct operating speed for filing a wide range of materials.

YOU don't need years of experience to acquire that "touch" of the expert hand filer. Just feed the work into the DoALL Band Filer and quickly get a smoother, more accurate finish. DoALL continuous band filing really bites off the metal in uniform quantities—lets you maintain precision of cut for both external and internal filing jobs. For tool and die shops, foundries, material fabricators or what are you, DoALL band filing is your answer to better, faster work at minimum cost. Ask for a FREE DEMONSTRATION in your own plant. Call your local DoALL store or write:

THE DoALL COMPANY, 254 N. Laurel Ave., Des Plaines, Ill.

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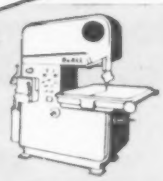
Learn more on how DoALL band filing can do every filing job better, faster and at lower cost.

BM-10

INDUSTRY'S NEW TOOLS

DoALL

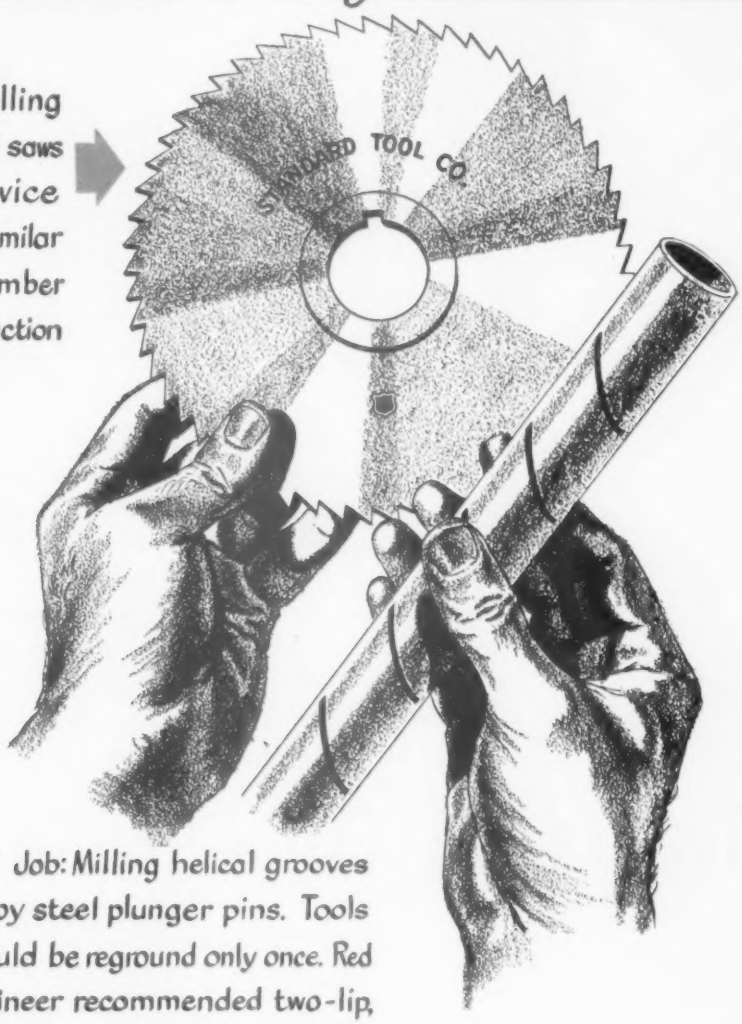
33 SALES-SERVICE STORES



Machine Tools . . . Gaging Equipment . . . Tool Steel . . . Band Tools . . . Metal Working Supplies

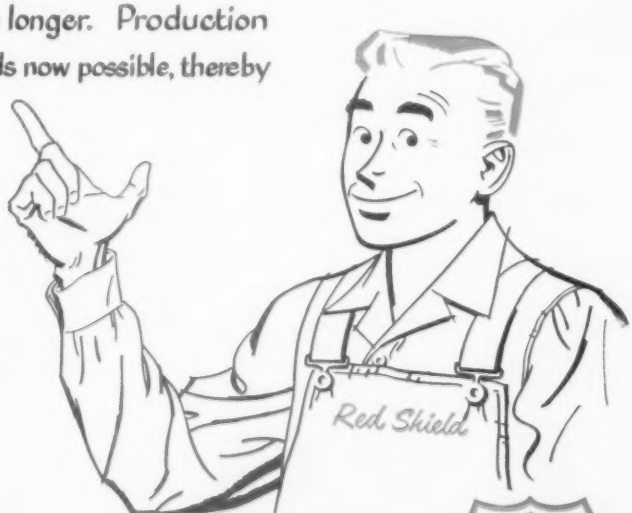
MILLING POINTERS.....by Red Shield

MORE TEETH...MORE PRODUCTION. Milling 45°, 3/32" cross slot in steel tubing dulled saws after 8 to 10 pieces. Red Shield Service Engineer suggested metal slitting saw similar to Style No. 724 but with a greater number of teeth. Result...tool life doubled. Production increased.



33% MORE OUTPUT. Job: Milling helical grooves in 3/8" diameter alloy steel plunger pins. Tools soon dulled and could be reground only once. Red Shield Service Engineer recommended two-lip, double-end, high helix type mills with special surface treatment. Mills stay sharp longer. Production increased 33%. Two regrinds now possible, thereby reducing tool costs.

CUTTING PROBLEMS ? Our Red Shield Service Staff is constantly working on all kinds of metal cutting problems. Their experience is yours for the asking. Simply call your Standard Tool Co. distributor.



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THE STANDARD LINE: *Drills • Reamers • Taps • Dies • Milling Cutters • End Mills • Hobs • Counterbores • Special Tools*

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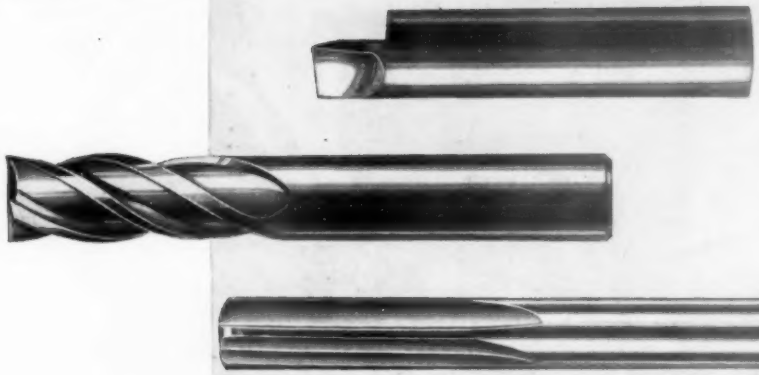

They're PRECISION GROUND-FROM-THE-SOLID

QUALITY ENGINEERED

END MILLS
ROTARY FILES
BORING BITS
REAMERS
BURS and others
by ATRAX

Write for our complete catalog now

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fine tools that promote consistent accuracy

Even the most highly skilled machinist finds it easier to maintain high production with consistent accuracy when equipped with quality tools. The added assurance which they afford permits faster precision work with less fatigue.

Brown & Sharpe supplies a complete line of Machinists' Tools that represent the fullest measure of sound design, precision manufacture and proven reliability. They are universally recognized by machinists as the criterion of quality tools.

Write for complete small tools catalog.
Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

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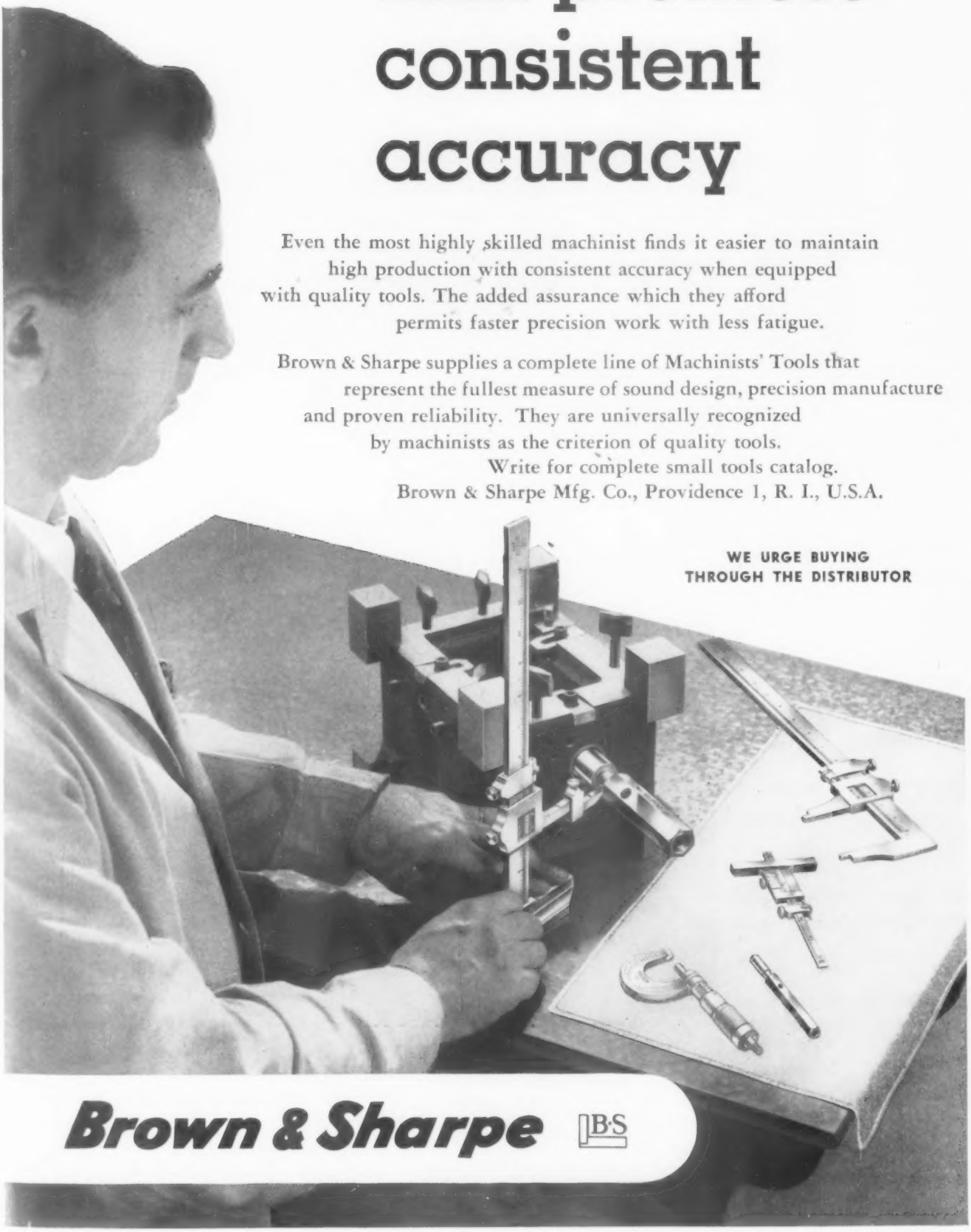

Brown & Sharpe B·S

IF YOU COULD SEE A DoALL surface grinding demonstration

YOU would witness DoALL precision surface grinders do *any* surface grinding job better, faster. You could run this test:

1. Take a .020" cut in a piece of hardened tool steel. Halfway across the work reverse the crossfeed and you'll find NO "sparkout." Work is ground flat in one operation. The machine is so rigid you can take a heavy cut without fear of spindle "give" or "spring."

2. Stop the work under the wheel and without raising wheel stop the motor. The wheel coasts to a stop without touching the work surface. It took all the metal intended in one clean pass.

3. Pencil mark the work surface. By lowering the wheel .0001" only the pencil marks are removed. DoALL grinders are rigid but when you adjust the vertical column support the machine obeys—no "hang up."

"COOL GRINDING" MULTIPLIES DoALL GRINDING EFFICIENCY

With the DoALL "Cool Grinding" attachment,* coolant flows through the wheel and out in a fine mist at the point of work. This gives:

1. Faster stock removal.
2. Accurate dimensional control.
3. Freedom from cracks or burns.
4. Longer wheel life.

You can do precision grinding faster and better with DoALL "Cool Grinding." No special wheels, tanks or pumps needed. Ask about it!

*Pat. No. (2470350)

YOU can have this demonstration FREE in your own plant, at your convenience. See for yourself how DoALL rigid precision hydraulic surface grinding can help you. Ask for FREE DEMONSTRATION. Call your DoALL Store or write:

The DoALL Company
254 N. Laurel Ave.
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DoALL

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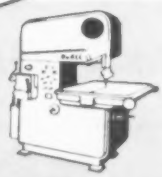
CALL DoALL FOR:

GR4



Machine Tools . . . Gaging Equipment . . . Tool Steel . . . Band Tools . . . Metal Working Supplies

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TURN TO RUTHMAN GUSHER MACHINE TOOL COOLANT PUMPS

With production stepped up to take care of civilian and defense demands the performance of every part of your metal cutting machinery is important.

When you specify Ruthman Gusher Pumps you are sure. For Gusher Pumps have proved that they give dependable service.

There is no packing nor priming needed. All rotating parts are electronically balanced to cut vibration to a minimum. With no metal-to-metal contact within the impeller housing this friction is eliminated. Ruthman Pumps are built to give you long trouble-free service.

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THE RUTHMAN MACHINERY CO.

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SEND FOR THIS NEW MANUAL

—20 pages packed with useful data!

This is a brand new section of the Cerro Alloys Application Data File. Its twenty pages are literally packed with valuable information and illustrations of the Cerromatrix Method of Punch and Die Setting—a method that saves untold costly man-hours of labor in the making of all kinds of metal-working dies: blanking, sectional, progressive, lamination, perforating, combination, compound, pierce and cut-off dies—or what-have-you. Write for your free copy today—on your letterhead, please.

CERRO de PASCO Corporation

(formerly Cerro de Pasco Copper Corporation)
31 Pine St. New York 5, N. Y.

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Walker Magnetic Chucks Hold Everything

Walker Chucks save setup time, eliminate need for costly and time-consuming clamps and work-holding fixtures.

Walker Chucks Permanent Type available in the following sizes:

RECTANGULAR			SWIVEL	ROTARY
4" x 8"	6" x 18"	10" x 15"	4" x 8"	4" 12"
5" x 10"	8" x 18"	10" x 24"	6" x 18"	6" 14"
6" x 12"	8" x 24"	12" x 24"	8" x 24"	9" 16"
				10"

O. S. WALKER CO. Inc.

WORCESTER 6, MASSACHUSETTS

Original Designers - Builders of Magnetic Chucks

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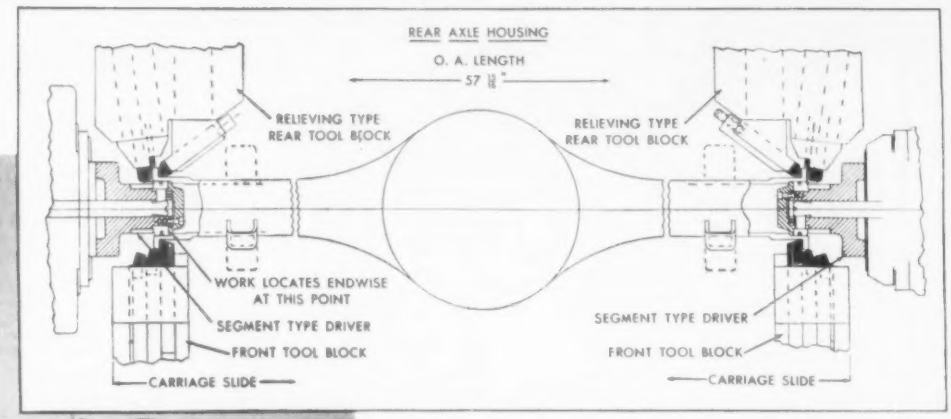
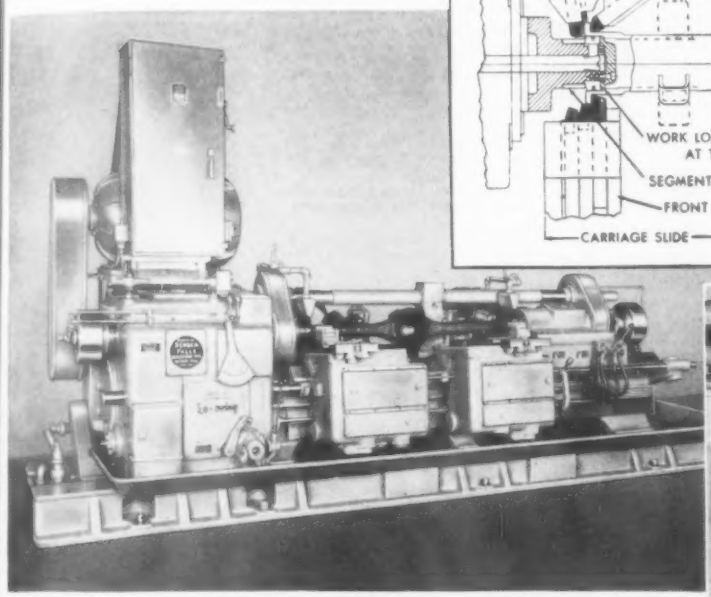
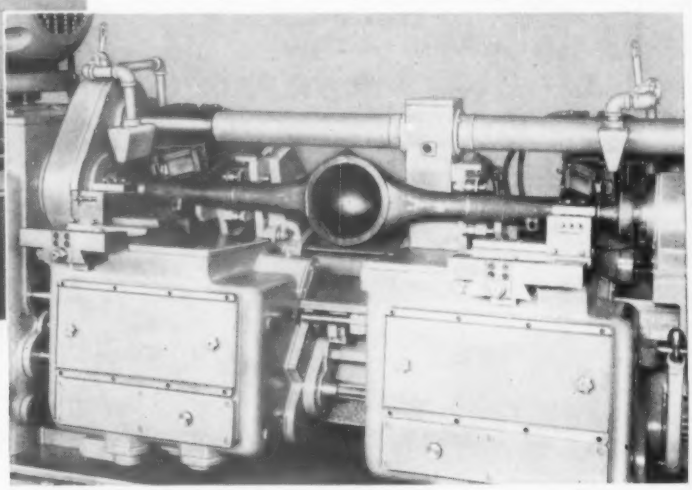
No Postage Needed

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK







MODEL "AR" Lo-swing WITH DOUBLE END DRIVE CUTS MACHINING COSTS ON REAR AXLE HOUSING

Problem: To turn and face both ends of Rear Axle Housing simultaneously.

Solution: The Model AR Automatic Lo-swing Lathe selected for this job was equipped with a Double End Drive to secure a balanced, efficient drive and prevent torsional deflection of the Axle Housings while under cut.

The right-hand Head of the Double End Drive Mechanism is a massive, two-piece unit securely clamped to the ways of the bed. Its top part slides on large bearing surfaces and is pneumatically-operated to facilitate loading and unloading of the work. The large diameter drive shaft for this head is splined to permit free longitudinal movement of the sliding member, and is supported with a central bearing.

The close-up view above shows details of the tooling and also the two spring-loaded vibration dampeners which prevent vibration of the out-of-balance part when revolved at high speed. This view also shows the two front carriages; the left-hand carriage feeds towards the headstock while the right-hand carriage feeds towards the tailstock. The mechanism for reversing the feed on the right-hand carriage is enclosed in the housing shown on the extreme right-hand end of the bed in the overall view above.

The axle housing is driven with two pneumatically-operated expanding segments...the air operating cylinders being mounted directly on the right and left hand Driving Head Spindles. Details of the tooling are shown in line drawing.

The operating cycle consists of loading the Axle Housing in two cradles, after which the sliding member of the right hand head advances and locates the housing endwise in relation to the driving chucks. This first movement is controlled by a four-way air valve at the right hand end of the machine. The second movement of this valve closes the two driving chucks. The machine is then started with the main clutch control lever located on the right side of the right-hand carriage, which is the normal operating position.

The automatic machining cycle then takes place and the machine stops automatically at the end of the cycle, ready for unloading and reloading. Consult Seneca Falls Engineering Staff on your turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

CARD Pipe TAPS

Double-Checked To Assure Top Performance At Ordinary Cost!

Card goes a long way beyond routine factory inspection to assure standardized accuracy. We employ the famous Pittsburgh Testing Laboratory to buy Card Taps anywhere on the open market — and to test them thoroughly, certifying the results.

That's why the Card Taps *you* buy are certified* — and why you can depend on every one for the same unfailing dependability and long, economical service life. And remember: *Card Certified Taps cost no more than ordinary taps!*

Your nearby Card Distributor can supply you with Card Pipe Taps — or other Card Taps — in the types and sizes you need. Contact him for prompt, helpful service.

TAPS
The Certified Cutting Tools*
* by the Pittsburgh Testing Laboratory
Also makers of DIES • SCREW PLATES
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WOODWORTH

Nawlide GAGES

The surface hardness of Woodworth NAWLIDE Gages is equivalent to that of Tungsten Carbide gages . . . and the cost per gage is one third as much! . . . In other words, NAWLIDE Gages will check three times as many parts per dollar as any other gage. . . . These laboratory and shop test statistics *were furnished* by Woodworth customers. . . . It will be profitable for *you* to write for details and investigate NAWLIDE. . . . Why don't *you* compare Woodworth NAWLIDE Gages with *any other gage* on the market today?

Accuracy you can trust

WOODWORTH

N. A. WOODWORTH CO. • 1300 EAST NINE MILE ROAD • DETROIT 20, MICHIGAN

PRECISION GAGES • DIAPHRAGM CHUCKS • CONE-LOK JIGS • PRECISION PARTS

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100,000 square feet of exhibits of the newest ideas in machines, machine controls and machine accessories, tools and gages, materials handling. Plus new tool and die materials, new manufacturing processes, new ideas in inspection methods and equipment, quality control—all designed to help you boost productivity, cut cost, improve product quality.

Five days of technical conferences, discussion panels and forums—the most important in A.S.T.E. history:

Monday—Inspection and Quality Control Day
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Friday—Machine Accessories, Drives and Controls Day

Estimated attendance, March 17 to 21, inclusive—80,000.

It is NOT too early to make your reservation

AMERICAN SOCIETY OF TOOL ENGINEERS
EXPOSITION COMMITTEE
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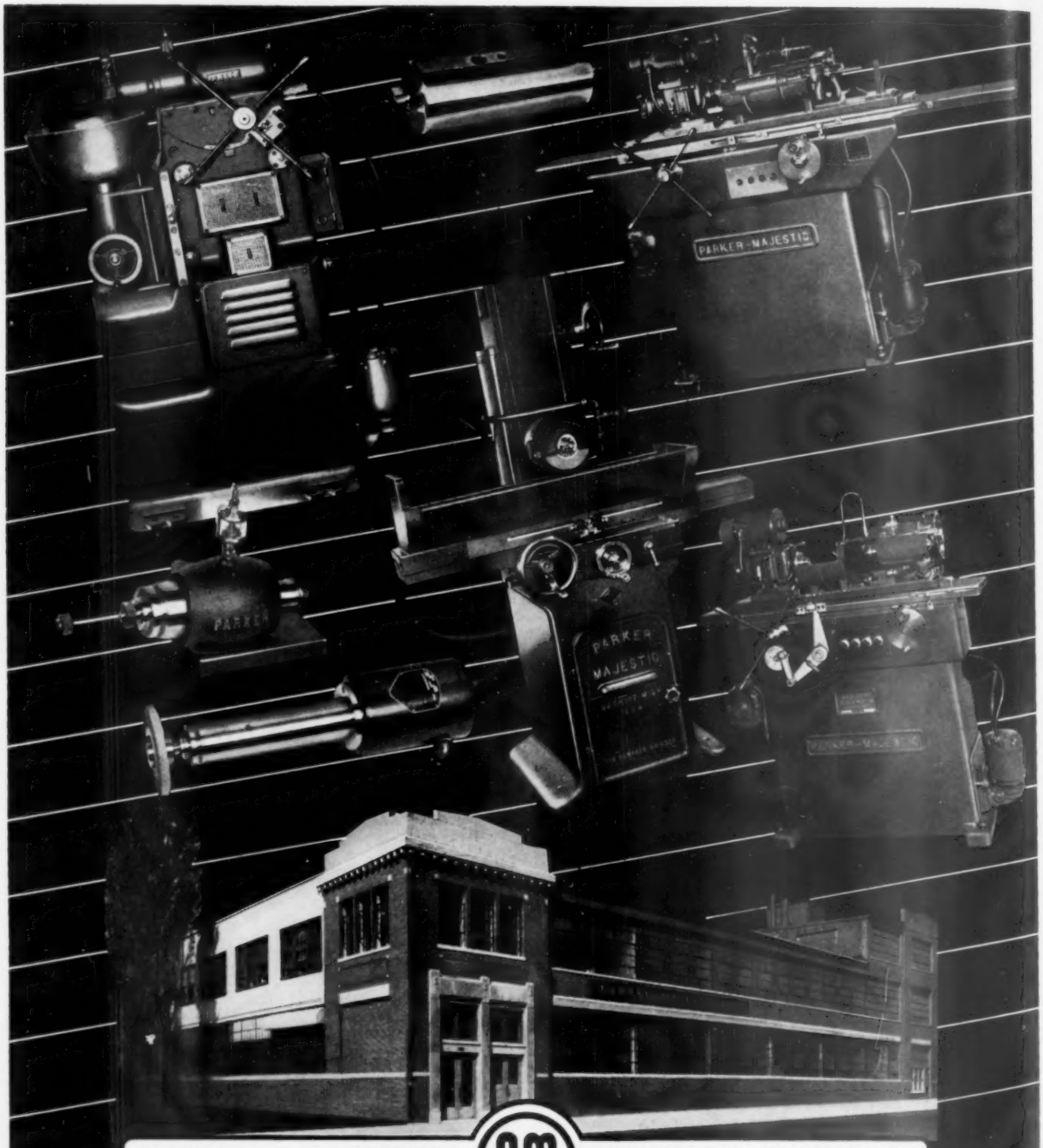

PARKER • MAJESTIC PM PRECISION MACHINES

Above is pictured the home and products of the

PARKER-MAJESTIC, INC.

For over twenty-one years this company has manufactured the Parker Spindles used in Precision Grinding, Boring and Milling applications.

Supplementary products include the well known line of Parker-Majestic Internal, External, No. 2 Surface and Rotary Surface Grinders.

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The Right Combination for Today's *different* Tap and Drill Needs

Companies producing new items, switching to different material specifications, on old or new products, can take advantage of the detailed knowledge of the Besly Serviceman in the application of drills and taps to today's new working conditions.

Trained in factory and field in tool design and job applications, he can help to speed the transition by giving you tools the *way* you specify them . . . *when* you need them. Then, the *right* tools—plus Besly's consistent quality tap-to-tap—helps you maintain or even reduce present tool costs. Save time — save money — ask Besly!

BESLY
UNSURPASSED ACCURACY AT EVERY VITAL POINT

Microcentric CHAMFER
Micro finish, concentric to tenths of thousands. Cuts freely and to size without burring or welding.

Solid Ground THREAD FORM
For angle and lead accuracy, eliminates gauging problems and control of pitch diameter to tenths of thousandths.

"Right" ROCKWELL
Taps pre-inspected for correct Rockwell hardness.

Mirror Finish FLUTES
Correct design to provide freer chip flow and longer tap life.

Tru-Square DRIVER
Square and shank fit correctly in chucks and holders. No wobble to cause oversize holes.

It's New . . it's Free!

This new Tapping Manual contains latest data on tap selection and application and best tapping procedures. Prepared by shop men for shop men. Tap fits and drills sizes are listed. Write today on your business letterhead for your copy.

BESLY

TAPS—the world's most accurate tap.

TWIST DRILLS AND REAMERS—Complete line for every need.

BESLY-TITAN ABRASIVE WHEELS AND DISCS—individually formulated for your job.

GRINDERS that reduce costs on every type of surface grinding.

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Index of The Tool Engineer Advertisers

DECEMBER, 1951

The Index to Advertisers is published as a reader service. Although every precaution is taken to assure correct listing, no allowance will be made for error or omission.

*Exhibitor in 1952 ASTE Industrial Exposition

♦User of ASTE Data Sheets

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keep your machines producing

better, longer, at lower cost...

with

BALAS COLLETS

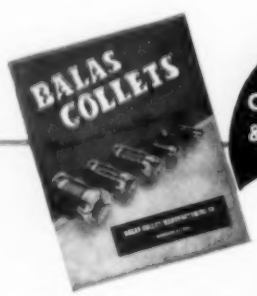
U. S. PAT. No. 2,228,337

Illustrated is the "CB" Master Collet. Patents owned by Balas. The famous "Martin" and "CT" Master Collets can also be supplied.

Whether your runs are long or short... on new machines or old... regardless of the size and type of bar stock you use, Balas Collets will enable your machines to produce better work... longer... at lower cost!

Balas Collets are precision machined from selected steel, properly heat treated and rigidly inspected to insure greater accuracy and longer life. In addition, all Balas Collets are cam-ground on the taper to a special "Cloverleaf" shape. This prevents "sticking" in the chuck head, permits faster opening and closing, allows tighter gripping and reduces chatter.

You can always expect more from Balas Collets under the toughest operating conditions, yet they cost no more than ordinary collets. Most standard sizes are carried in stock for immediate delivery. Order your supply today!



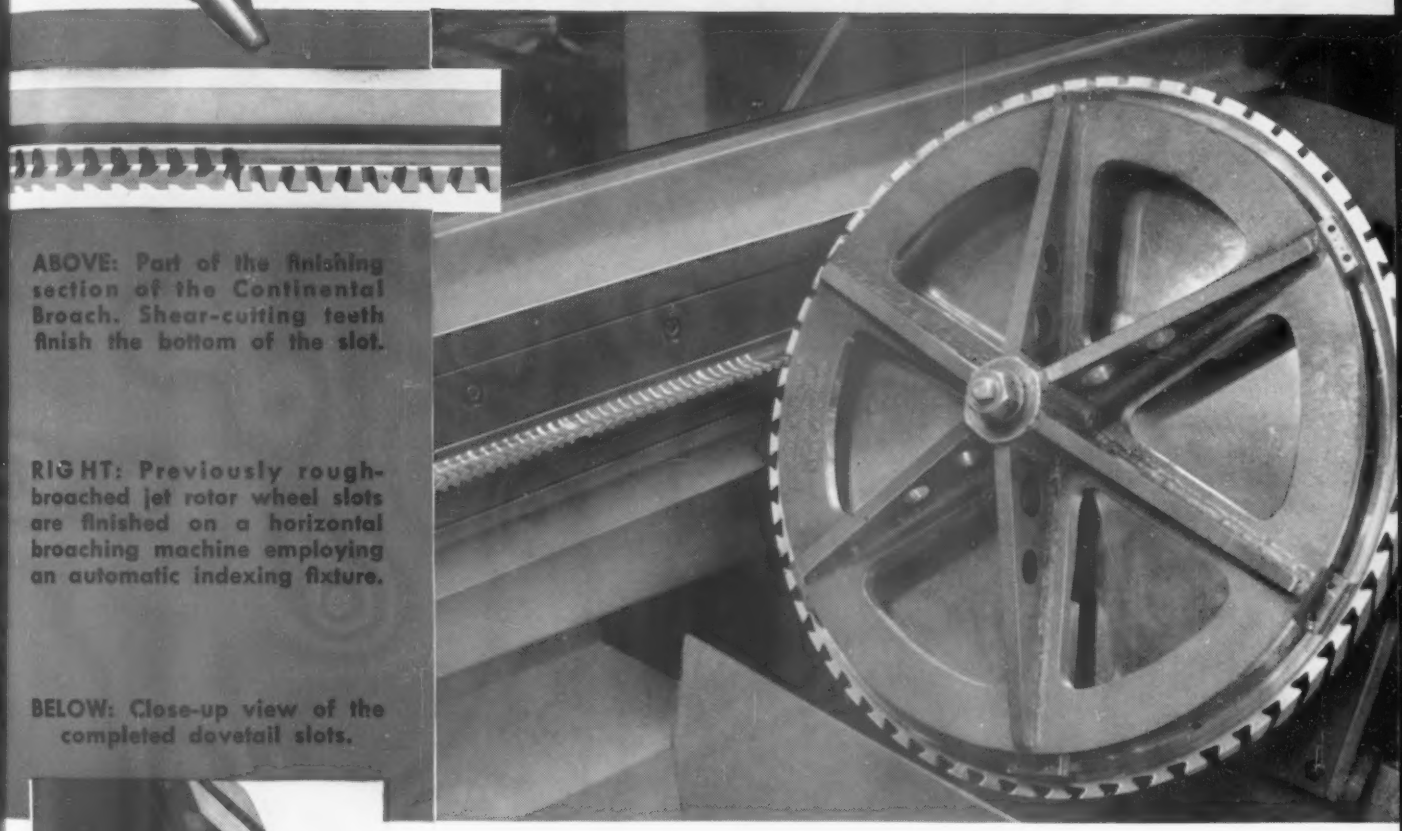
WRITE FOR CATALOG 50 & PRICE LIST

BALAS COLLET MANUFACTURING CO.

1560 EAST 27th STREET CLEVELAND 14, OHIO

WORLD'S LARGEST MANUFACTURER OF COLLETS EXCLUSIVELY

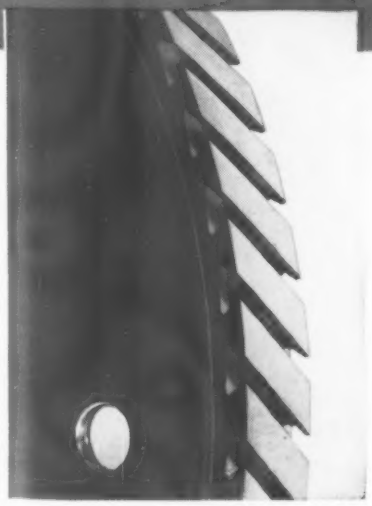
JET ROTOR WHEELS SLOTTED BY CONTINENTAL BROACHES



ABOVE: Part of the finishing section of the Continental Broach. Shear-cutting teeth finish the bottom of the slot.

RIGHT: Previously rough-broached jet rotor wheel slots are finished on a horizontal broaching machine employing an automatic indexing fixture.

BELOW: Close-up view of the completed dovetail slots.



CONTINENTAL BROACHES TAKE HEAVY CUTS TO MINIMIZE WORK HARDENING

The heat-resistant stainless steels used in jet aircraft engines present a special machining problem because of their toughness and work-hardening tendencies. The solution is a rigid setup, ample power and properly-designed tools.

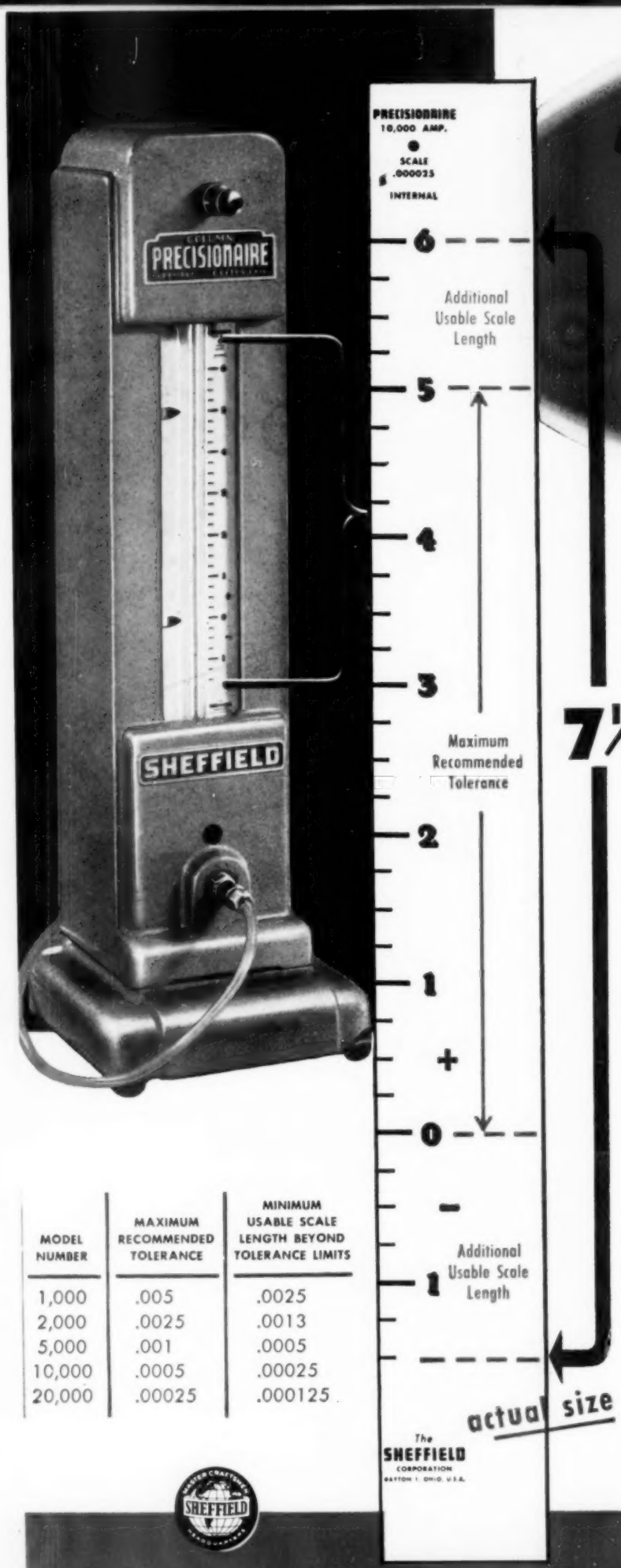
Shown here is a typical application of a Continental Broach cutting accurate, uniform dovetail slots in a jet rotor wheel. The broach is designed to take substantial cuts to minimize work hardening. These slots are cut in two operations, although some shops prefer to complete each slot in a single pass.

For the most efficient broaches to work with your broaching equipment contact your local Ex-Cell-O field engineer, or write the Continental Division of Ex-Cell-O.

CTW

51

CONTINENTAL TOOL WORKS
DIVISION OF EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN



Twice as much Usable Scale Length with a SHEFFIELD COLUMN PRECISIONAIRE

7½ inches of usable scale length—*more than twice as much as most other air gages.*

MANY MORE CLASSIFICATIONS—more selectio can be made because of the extra scale length manufacturing tolerances can be widened to sa time and cost without sacrificing quality.

SHOWS *HOW MUCH* PARTS ARE OUT—especial advantageous where parts are coming consistently the borderline or just outside tolerance limits.

BETTER FOR BRINGING TO SIZE—Readings can b taken earlier when approaching size so that th operator is sure of not going beyond tolerance, fact, he can accurately work to desired limits with the tolerance zone.

CLOSER MACHINE CONTROL—with greater sca length the trend of the machine and tooling to go o of control *shows up sooner,* reducing possibility rejects.

MORE ACCURATE QUALITY CONTROL CHART —the column Precisionaire scale is a running quali control chart in itself. Readings can be transferred a chart with greatest accuracy.

OPERATORS LIKE THE LONG SCALE—with high amplifications the spread for the tolerance and ea classification is wider, making the operator's job easi

MODEL NUMBER	MAXIMUM RECOMMENDED TOLERANCE	MINIMUM USABLE SCALE LENGTH BEYOND TOLERANCE LIMITS
1,000	.005	.0025
2,000	.0025	.0013
5,000	.001	.0005
10,000	.0005	.00025
20,000	.00025	.000125

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